

POLYCHAETOUS ANNELIDS FROM CALIFORNIA  
INCLUDING THE DESCRIPTION OF TWO NEW GENERA AND  
NINE NEW SPECIES  
(PLATES 19-26)

BY OLGA HARTMAN

The marine chaetopods of the Dillon Beach areas, in Marin and Sonoma counties, are much like those from other parts of northern and southern California. The 101 species, reported below, were collected during the summers of 1935 and 1941. Seven species and one subspecies are believed new to science, and some others are first records either from California or from the areas indicated. The collections are deposited in the Allan Hancock Foundation of The University of Southern California; a duplicate set is at the University of California.

The areas investigated include, in Marin County, the muddy sand flats of the upper end of Tomales Bay, the rocky shore of Tomales Point, which is the outer end of the peninsula forming the western shore of Tomales Bay, a long, sandy shore at Dillon Beach on the southern end of Bodega Bay, and a brackish tidal stream called Stempell Creek, emptying into Bodega Bay to the east and north; and, finally, Bodega Lagoon in Sonoma County. The extensive beds of broad-leaved eel grass (*Zostera*), very abundant in Tomales Bay in the summer of 1935, are now practically gone. The general aspect of the bay is thus notably altered at low water, and the fauna there is, no doubt, significantly different.

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The following species, by families, were collected.

FAMILY POLYNOIDAE

1. *Arctonoë fragilis* (Baird)
2. *Arctonoë vittata* (Grube)
3. *Halosydna brevisetosa* Kinberg
4. *Harmothoë imbricata* (Linnaeus)
5. *Harmothoë lunulata* (delle Chiaje)
6. *Lepidonotus caelorus* Moore

## FAMILY CHRYSOPETALIDAE

7. *Paleanotus chrysolepis* Schmarda

## FAMILY AMPHINOMIDAE

8. *Pareurythoë californica* (Johnson)

## FAMILY HESIONIDAE

9. *Podarke pugettensis* Johnson

## FAMILY PHYLLODOCIDAE

10. *Eteone dilatata* Hartman  
11. *Eulalia aviculiseta* Hartman  
12. *Eumida sanguinea* (Oersted)  
13. *Genetyllis castanea* (Marenzeller)

## FAMILY SYLLIDAE

14. *Exogone*, sp.  
15. *Haplosyllis spongicola* (Grube)  
16. *Odontosyllis phosphorea* Moore  
17. *Odontosyllis parva* Berkeley  
18. *Pterosyllis*, sp.  
19. *Syllis alternata* Moore  
20. *Trypanosyllis adamanteus* Treadwell  
21. *Trypanosyllis gemmipara* Johnson  
22. *Typosyllis pulchra* (Berkeley)

## FAMILY NEPHTYIDAE

23. *Nephtys caecoides* Hartman  
24. *Nephtys californiensis* Hartman

## FAMILY NEREIDAE

25. *Neanthes brandti* (Malmgren)  
26. *Neanthes lighti* Hartman  
27. *Nereis eakini* Hartman  
28. *Nereis latescens* Chamberlin  
29. *Nereis mediator* Chamberlin  
30. *Nereis neonigripes* Hartman  
31. *Nereis procera* Ehlers  
32. *Nereis vexillosa* Grube  
33. *Platynereis agassizi* (Ehlers)

## FAMILY GLYCERIDAE

34. *Glycera americana* Leidy  
35. *Glycera tenuis*, new species  
36. *Glycera robusta* Ehlers  
37. *Hemipodus borealis* Johnson

## FAMILY GONIADIDAE

38. *Glycinde armigera* Moore
39. *Goniada maculata* Oersted

## FAMILY EUNICIDAE

40. *Eunice longicirrata* Webster
41. *Marphysa stylobranchiata* Moore

## FAMILY ONUPHIDAE

42. *Diopatra ornata* Moore
43. *Nothria iridescens* (Johnson)

## FAMILY LUMBRINERIDAE

44. *Lumbrineris latreilli* Audouin and Edwards
45. *Lumbrineris zonata* Johnson

## FAMILY ARABELLIDAE

46. *Arabella iricolor* (Montagu)
47. *Drilonereis nuda* Moore

## FAMILY ORBINIIDAE

48. *Naineris laevigata* Grube
49. *Orbinia johnsoni* (Moore)
50. *Scoloplos acmeceps* Chamberlin

## FAMILY SPIONIDAE

51. *Boccardia proboscidea* Hartman
52. *Boccardia uncatata* Berkeley
53. *Nerine cirratulus* (delle Chiaje)
54. *Polydora giardi* Mesnil
55. *Polydora brachycephala* Hartman
56. *Pygospio californica* Hartman
57. *Spio*, sp.
58. *Streblospio benedicti* Webster

## FAMILY MAGELONIDAE

59. *Magelona pitelkai*, new species

## FAMILY CHAETOPTERIDAE

60. *Phyllochaetopterus prolifica* Potts

## FAMILY CIRRATULIDAE

61. *Cirratulus cirratus* (O. F. Müller)
62. *Cirriformia luxuriosa* (Moore)
63. *Cirriformia spirabrancha* (Moore)
64. *Dodecaceria fistulicola* Ehlers

## FAMILY CAPITELLIDAE

65. *Dasybranchus lumbricoides* Grube
66. *Mediomastus californiensis*, new genus and species
67. *Notomastus magnus* Hartman
68. *Notomastus tenuis* Moore

## FAMILY MALDANIDAE

69. *Axiothella rubrocincta* (Johnson)

## FAMILY OPHELIIDAE

70. *Armandia bioculata* Hartman
71. *Ophelia limacina* Rathke
72. *Pectinophelia dillonensis* Hartman
73. *Pectinophelia williamsi* Hartman
74. *Polyopthalmus pictus* Dujardin
75. *Thoracophelia mucronata* (Treadwell)

## FAMILY PECTINARIIDAE

76. *Cistenides brevicoma* (Johnson)
77. *Pectinaria californiensis* Hartman

## FAMILY SABELLARIIDAE

78. *Phragmatopoma californica* (Fewkes)
79. *Sabellaria cementarium* Moore

## FAMILY AMPHARETIDAE

80. *Schistocomus hiltoni* Chamberlin

## FAMILY TERESELLIDAE

81. *Amaea occidentalis*, new species
82. *Eupolymnia crescentis* Chamberlin
83. *Loimia montagui* (Grube)
84. *Pista elongata* Moore
85. *Pista pacifica* Berkeley
86. *Polycirrus*, sp.
87. *Ramex californiensis*, new genus and species
88. *Spinospaera oculata*, new species
89. *Terebella californica* Moore
90. *Thelepus crispus* Johnson

## FAMILY SABELLIDAE

91. *Chone mollis* (Bush)
92. *Chone minuta*, new species
93. *Sabella media* (Bush)
94. *Eudistylia polymorpha* (Johnson)



95. *Eudistylia vancouveri* (Kinberg)  
 96. *Pseudopotamilla ocellata* Moore  
 97. *Pseudopotamilla socialis*, new species

## FAMILY SERPULIDAE

98. *Crucigera zygophora* (Johnson)  
 99. *Serpula vermicularis* Linnaeus  
 100. *Dexiospira spirillum* (Linnaeus)  
 101. *Laeospira borealis* (Daudin)

The most practical reference for the nonspecialist continues to be Fauvel (1923, 1927, Faune de France). This gives excellent diagnoses and figures of many genera, although many occurring in the eastern Pacific are not included. American species, also, differ widely from the European ones, except for a few which may be regarded cosmopolitan in distribution. An effort has been made herein to refer either to an illustrated or to a diagnostic description for each species. It is hoped that the student will not rely only on the keys given below but will consult a more complete account for more certain identification. Measurements given are only approximate and are based largely on mature individuals.

## Family Polynoidae

## KEY TO SPECIES

1. With 12 pairs of elytra, their surface more or less tubercled . . . . . *Lepidonotus caelorus*  
 1. With 15 pairs of elytra, these more or less easily detached . . . . . 3  
 . . . . . *Harmothoë*  
 1. With 18 pairs of elytra, these more or less firmly attached; free living or commensal . . . . . *Halosydna brevisetosa*  
 1. With more than 20 pairs of elytra, the last few pairs noticeably smaller than those preceding; usually pale in life; typically commensal . . . . . 2  
 . . . . . *Arctonöë*  
 2. Elytra ruffled at their outer margins, usually reddish or yellow in life; commensal with asteroids . . . . . *A. fragilis*  
 2. Elytra nearly or quite smooth, pale or somewhat fuscus; commensal with mollusks, echinoderms, and other organisms, rarely free living . . . . . *A. vittata*  
 3. Larger, typically over 20 mm long; free living; first pair of elytra usually pale, others dark . . . . . *H. imbricata*  
 3. Usually smaller, typically less than 20 mm long; commensal with leptosynaptids; elytra pale except for a dark spot near the center . . . . . *H. lunulata*

**Halosydna brevisetosa** Kinberg

Kinberg, 1855, p. 385; Hartman, 1939, p. 34 (with synonymy).

*Polynoë brevisetosa* Johnson, 1897, pp. 167-170, pls. 7, 8.

This is very common throughout the Dillon Beach areas; it is free living under stones and in crevices, among mussels, and commensal in tubes of *Thelepus crispus*, *Platynereis agassizi*, and *Pista pacifica*. Both dark and light color phases abound. Length is about 30 to 60 mm. This was the first species of polychaete described from California; Kinberg collected it at Sausalito, in San Francisco Bay.

**Arctonoë vittata** (Grube)

*Polynoë lordi* Johnson, 1897, pp. 175-177, pls. 7, 8.

Hartman, 1939, p. 29 (with synonymy).

At Tomales Point, ocean side, it is commensal with *Cryptochiton stelleri* (Middendorff), *Diadora aspera* (Eschscholtz), *Dermasterias imbricata* (Grube); rarely it is free living. Length is about 40 to 50 mm.

**Arctonoë fragilis** (Baird)

*Polynoë fragilis* Johnson, 1897, pp. 179-181, pls. 7, 8.

At Tomales Point, ocean side, it is commensal with species of *Pisaster*. Length is 45 to 65 mm.

**Lepidonotus caelorus** Moore

Moore, 1903, pp. 412-414, pl. 23; 1905, pp. 546-547, pl. 36.

Hartman, 1938, p. 108; 1939, p. 44.

At Tomales Point, ocean side, it was taken from kelp holdfasts. Length is 30 to 40 mm.

**Harmothoë imbricata** (Linnaeus)

Fauvel, 1923, p. 55, fig. 18.

At Tomales Point and Dillon Beach, this occurs in rocky crevices and under sea urchins. Eggs are carried under elytra in June. Length is 30 to 45 mm.

**Harmothoë lunulata** (delle Chiaje)

Plate 20, Figs. 10-22

Fauvel, 1923, pp. 70-73, fig. 26; Berkeley, 1941, p. 21.

*H. lunulata* var. *pacifica* Monro, 1928, pp. 559-560.

Numerous collections come from Tomales Bay, especially from the burrows of *Leptosynapta albicans* (Selenka). Total number of segments

is 37, length 10 to 20 mm. The last elytra usually extend over the pygidial region so as to almost or entirely cover it. The dorsum is well covered by the deeply imbricated elytra, which also extend laterally and cover about the proximal two thirds of the parapodial length but leave exposed the spinous tips of notosetae and the free portions of neurosetae (pl. 20, fig. 10).

The prostomium is slightly longer than broad, with well-marked median sulcus, dividing it into 2 halves; anterior margins are prolonged anteriorly as frontal, diverging processes between which median and lateral antennae emerge. Eyes are reduced, the first pair anterior to the middle of the prostomium and dorsolateral in position; the posterior ones are nearer together and located near the posterior margin of the prostomium. Median and lateral antennae are clavate, with slight subdistal thickening; the lateral ones are only about half as long as the median, but all are similar in shape, and terminate in slender filaments. The median antenna has a heavy basal cirrophore, extending conspicuously between the prostomial lobes (pl. 20, fig. 11).

Peristomial cirri are similar in length and form to the median antenna. A stout, curved seta is inserted near the middle of the cirrophore (pl. 20, fig. 11). Parapodia are heavy, well developed, project laterally; they are about two thirds as long as the width of the body in the median region. The notopodium is short, its setae disposed in a spreading whorl, the dorsalmost about half as long as the ventralmost; the longest ones extend distally to the bases of the neurosetae. The neuropodium is longer, with presetal lobe distally oblique along its free end; it terminates in a slender acicular lobe along its dorsal side; the aciculum does not always project from it. The postsetal lobe is shorter and evenly rounded. The ventral cirrus is inserted proximally to the middle of the parapodial base; it has a papillar lobe at its base. Dorsal cirri are long, extend distally beyond neuropodia, and are inserted on elongate cirrophores (pl. 20, fig. 19).

Notosetae are in fascicles of 20 to 30; they all resemble one another but are of varying lengths, the longest on the ventral side; their tips are bluntly conical, the spinous region narrow (pl. 20, figs. 21, 22); they are thicker than the neurosetae. The latter are in vertical series of 20 to 30 in a fascicle, directed laterally; each terminates distally in a falcate hook with a long, slender, accessory tooth; the spinous region consists of 6 to 10 rows of pectinae (pl. 20, fig. 20).

Elytra number 15 pairs, are easily detached; they increase in size from the second to the thirteenth pair (pl. 20, figs. 13-17) and decrease again to the last pair (pl. 20, fig. 18). All have entire margins and almost

smooth surface; there is usually a small dark spot over the elytral scar and a larger dark area on the inner or also posterior portion (pl. 20, fig. 10). The elytophoral scar is elongate in anteroposterior direction. Nephridial papillae are inconspicuous, directed upward between the bases of parapodia, from the ventral side. In life the color is pale except for dusky patches on elytra and cirri.

*H. lunulata* and its several varieties (see Fauvel, 1923) have been reported from widely scattered areas of the Atlantic and Mediterranean seas. Recently Monro (1928, pp. 559-560) described a variety, *pacifica*, from the Galapagos in 4 to 6 fms. Berkeley (1941, p. 21) recorded the species from southern California. It has been described as both free living and commensal, with holothurians or other chaetopods, notably species of *Marphysa*, *Arenicola*, *Polycirrus*, and *Mesochaetopterus*. The individuals from Tomales Bay were taken from the burrows of a holothurian.

### Family Chrysopetalidae

#### *Paleanotus chrysolepis* Schmarda

*Heteropale bellis* Johnson, 1897, pp. 163-164, pl. 6.

Hartman, 1940, p. 201.

At Tomales Point, ocean side, it occurs among Bryozoa and sponge masses. Length is 10 to 15 mm.

### Family Amphinomidae

#### *Pareurythoë californica* (Johnson)

*Eurythoë californica* Johnson, 1897, pp. 159-161, pl. 5.

Hartman, 1940, p. 203.

At Tomales Point, ocean side, it is under stones and in crevices. Though common in southern California, it is seen only occasionally in central California. It is the only known representative of this family in these northern latitudes. Length is 30 to 40 mm.

### Family Hesionidae

#### *Podarke pugettensis* Johnson

Johnson, 1901, pp. 397-398, pl. 3; Hartman, 1940, p. 211.

At Tomales Point, ocean side, it is commensal with *Patiria miniata* (Brandt) or species of *Pisaster*; it is sometimes free living, under stones. In life it is dark purplish brown. Length is 12 to 20 mm.

Family **Phyllodoceidae**

## KEY TO SPECIES

1. With 2 pairs of tentacular cirri on the first visible segment . . . . . *Eteone dilatatae*
1. With 4 pairs of tentacular cirri on the first visible segment . . . . . 2
2. Prostomium with a median, unpaired antenna . . . . . 3
2. Prostomium without an unpaired antenna; first tentacular segment dorsally reduced, ventrally distinct; dorsum and dorsal cirri often spotted with rust-colored pigment . . . . .  
. . . . . *Genetyllis castanea*
3. Proboscis covered with numerous small papillae; first 3 tentacular segments distinct from one another . . . . .  
. . . . . *Eulalia aviculiseta*
3. Proboscis smooth except for wrinkles of contraction; first tentacular segment dorsally reduced . . . . . *Eumida sanguinea*

**Eteone dilatatae** Hartman

Hartman, 1938, pp. 130-131, figs. 40-42.

This occurs in burrows in fine sandy beaches, at Dillon Beach, between Perch Rock Point and Pelican Point. In life it is long, pale yellowish, or posteriorly green. Length is 50 to 60 mm.

**Genetyllis castanea** (Marenzeller)

*Phyllodoce (Carobia) castanea* Moore, 1909, pp. 239-240.

Bergström, 1914, pp. 158-160, fig. 53.

This is found in holdfasts and algal masses, at Tomales Point, ocean side, and at Perch Rock Point, Dillon Beach. Length is 20 to 40 mm.

**Eumida sanguinea** (Oersted)

Fauvel, 1923, pp. 166-167, fig. 59.

At Tomales Point, ocean side, this occurs among rocks overgrown with algae and Bryozoa. Length is 20 to 25 mm.

**Eulalia aviculiseta** Hartman

Hartman, 1938, p. 122, figs. 1-6.

This was taken at Tomales Point, ocean side, at Second Sled Road, and north of Perch Rock Point; it occurs among rocks and algal debris. Characteristically it is green with dark intersegmental furrows on the dorsum. Length is 20 to 30 mm.

## Family Syllidae

## KEY TO SPECIES

1. Short, blunt, with few segments; dorsal cirri very long throughout; with conspicuous nuchal lappets on dorsal side of peristomium . . . . . *Pterosyllis*
1. Longer, often threadlike; dorsal cirri otherwise . . . . . 2
2. Prostomium covered over its posterior half with a nuchal hood . . . . . 3
2. Prostomium without nuchal hood . . . . . 4
3. Dorsum marked with dark pigment bands alternating with yellow bands at irregular intervals . . . . . *Odontosyllis phosphorea*
3. Red in life; tiny . . . . . *Odontosyllis parva*
4. Parapodia provided with only, or also, composite hooks . . . . . 5
4. Parapodia provided with only simple, coarse, distally prolonged setae . . . . . *Haplosyllis spongicola*
5. Minute; ventral and dorsal cirri reduced, inconspicuous; palpi fused throughout; median antenna of prostomium usually longer than the paired ones . . . . . *Exogone*
5. Larger; ventral and dorsal cirri more or less conspicuous; palpi free from each other for some distance . . . . . 6
6. Body more or less depressed; proboscis with a saw-toothed edge (trepan) . . . . . *Trypanosyllis* . . . . . 7
6. Body not greatly flattened; proboscis without a trepan . . . . . 8
7. Dorsum with bold red, transverse stripes . . . . . *T. gemmipara*
7. Dorsum with brownish, diamond-shaped spots on dorsum, segmentally arranged . . . . . *T. adamanteus*
8. Setae all composite . . . . . *Typosyllis pulchra*
8. Setae include simple and composite ones . . . . . *Syllis alternata*

Members of the family Syllidae are abundant in intertidal zones, but are very poorly known from California. The few species herein named are representative but by no means inclusive. Fauvel (1923) has given useful keys to some genera, and Berkeley (1938) has described some species from the American west coast.

***Odontosyllis phosphorea* Moore**

Moore, 1909, pp. 327-328, pl. 15, figs. 8-10.

This is found among eel grasses, in Tomales Bay and at Tomales Point, ocean side. Sometimes it occupies soft mucous tubes, on under surfaces of foreign objects. Length is 20 to 30 mm.



### ***Odontosyllis parva* Berkeley**

Berkeley, 1923, p. 6, figs. 1, 2.

At Tomales Point, ocean side, it is found among sponge and Bryozoa masses, and crawling over mussels; at Dillon Beach it has been taken from algae; others come from Moss Beach, San Mateo County, south to Pacific Grove. Epitokous males and females, and gravid atokous females are included. Color in life is bright red. Length is 10 to 14 mm.

The prostomium is broad, short, anteriorly truncate, as originally shown. Palpi are entirely ventral in position, free from each other, short, subglobular. In epitokous male individuals the 4 eyes are very dark, large, the 2 of a side fused with each other; in epitokous females and atokous individuals the eyes are pale red, smaller. The 3 prostomial antennae are short, cylindrical, the median one about a third again as long as the lateral ones. The nuchal hood is weakly trilobed and covers the prostomium less completely than originally shown. Ventral cirri are longer, foliaceous though equitriangular, not thick, blunt, as first shown.

Specialized natatory setae are first present from the nineteenth setiger in male epitokes and from about the twenty-first in female epitokes. I believe the original description was based perhaps on an early epitokous male individual, since the 4 eyes are shown already large, dark, and the dorsal fascicle of natatory setae are shown just beginning to emerge from the parapodial lobes.

### ***Trypanosyllis adamanteus* Treadwell**

Treadwell, 1914, pp. 235, 237, figs. 1-3.

This comes from Second Sled Road, Dillon Beach, among algae and from barnacle clumps. The dorsum is marked with pale diamond-shaped patches, surrounded by dark pigment, segmentally arranged. Length is 30 to 45 mm.

### ***Trypanosyllis gemmipara* Johnson**

Johnson, 1901, pp. 405-406, pl. 7, figs. 72-76; 1902, pp. 302-315, figs. 7-17.

At Tomales Point, ocean side, this occurs among Bryozoa, sponge and *Clavelina* masses. In life it is broad, depressed; it is pale, the segments crossed, dorsally, by conspicuous, transverse red lines, and the dorsal cirri are tinged with a similar pigment. Length is 40 to 55 mm.

### ***Haplosyllis spongicola* (Grube)**

Fauvel, 1923, pp. 257-258, fig. 95.

At Tomales Point, ocean side, it occurs among sponge and Bryozoa clumps. Length is 40 to 60 mm.

**Syllis alternata** Moore

Moore, 1908, pp. 323-325, figs. a-f; Berkeley, 1938, pp. 37-38.

At Second Sled Road, Dillon Beach, it is found among algae and in *Mytilus* beds; at Tomales Point, ocean side, it is in sponge and Bryozoa clumps. In life it is usually pale, with segments crossed by narrow transverse black lines, segmentally arranged. Length is 20 to 30 mm.

**Typosyllis pulchra** (Berkeley)

*Syllis pulchra* Berkeley, 1938, pp. 34-35, fig. 1.

At Second Sled Road, Dillon Beach, this was collected from *Mytilus* colonies by Harvey I. Fisher. The dorsum is chocolate brown, cirri are pale. Dorsal cirri have as many as 50 to 70 articles each, the successive rings closely crowded. An asexual stolon is present on many individuals; it occurs singly, from any one of the following segments: 42, 43, 45, 47, 49, 52, 53, or 59. The stolon consists of about 25 setigers. Length is 25 to 30 mm.

**Pterosyllis**, species

Fauvel, 1923, p. 279.

Several fragments come from Tomales Point, ocean side.

**Exogone**, species

Fauvel, 1923, p. 305; Berkeley, 1938, p. 44.

At Dillon Beach and surrounding vicinities, this occurs among algae, sponge, and hydroid growths. It is one of the smallest syllids in these areas. External gestation is typical. Length is 4 to 7 mm.

Family **Nephtyidae**

## KEY TO SPECIES

1. Smaller; prostomium and first few segments with broad, dark pattern on the dorsal side . . . . . *Nephtys caecoides*
1. Larger; prostomium with spread eagle pattern; first few segments usually pale dorsally; inhabits fairly clean sandy beaches . . . . . *Nephtys californiensis*

**Nephtys caecoides** Hartman

Hartman, 1938, pp. 148-149, fig. 63.

This is common in Tomales Bay and Bodega Lagoon, in muddy sand flats. Length is 80 to 100 mm.



**Nephtys californiensis** Hartman

Hartman, 1938, pp. 150-151, fig. 64.

At Dillon Beach, it is common in fairly clean sandy beaches, particularly in shifting sands. Length is 150 to 300 mm.

Family **Nereidae**

## KEY TO SPECIES

1. Some notopodia provided with simple, heavy, dark brown hooks  
 . . . . . *Platynereis agassizi*
1. Notopodia without simple hooks . . . . . 2
2. Notopodia provided with blunt, composite hooks and pointed,  
 composite setae; area V of proboscis usually lacks paragnaths  
 . . . . . *Nereis* 4
2. Notopodia provided with only pointed composite setae; area V  
 of proboscis usually with paragnaths . . . . . *Neanthes* 3
3. Larger; typically marine; dorsal parapodial lobe broad, foliaceous  
 . . . . . *N. brandti*
3. Smaller; typically in tidal stream beds; dorsal parapodial lobe  
 not broad . . . . . *N. lighti*
4. Dorsal parapodial lobe in posterior region long, straplike . .  
 . . . . . *N. vexillosa*
4. Dorsal parapodial lobe in posterior region sometimes somewhat  
 prolonged but never straplike . . . . . 5
5. Proboscis provided with many tiny paragnaths over both oral  
 and maxillary rings . . . . . *N. eakini*
5. Proboscis otherwise . . . . . 6
6. Paragnaths of proboscis all unusually tiny, inconspicuous; body  
 greatly prolonged; inhabits mud flats . . . . . *N. procerca*
6. Paragnaths of proboscis include some larger ones; body not  
 nearly so prolonged . . . . . 7
7. Parapodial lobes typically dark; dorsal lobe in posterior region  
 does not come to be noticeably longer than those in median region  
 . . . . . *N. neonigripes*
7. Parapodial lobes not dark . . . . . 8
8. Larger; body uniformly colored bright green to drab brown;  
 dorsal lobe in posterior region subrectangular, about 2 times as  
 long as broad . . . . . *N. mediator*
8. Smaller; dorsum pale, marked with dark pattern of interrupted  
 bars; dorsal lobes in posterior parapodia not rectangular . . .  
 . . . . . *N. latescens*

**Platynereis agassizi** (Ehlers)

*Nereis agassizi* Johnson, 1901, pp. 399-400, pl. 4.

This is common throughout the Dillon Beach and Tomales areas, usually associated with algae; at Tomales Point, ocean side, it constructs matted masses in narrow-leaved eel grass. Unlike most nereids, it is a tube dweller, and sometimes harbors *Halosydna brevisetosa* Kinberg. Length is 50 to 70 mm.

**Neanthes brandti** (Malmgren)

Hartman, 1938, p. 80; 1940, p. 219.

At Tomales Bay, it is found in sand flats. Length is 200 to 500 mm.

**Neanthes lighti** Hartman

Hartman, 1938, pp. 80-81, figs. 1-4.

At Stempell Creek, near the mouth, and in Tomales Bay, it occurs in sandy flats. It occupies vertical burrows open at the surface. It was found viviparous in June, 1941, by Miss Marian Pettibone. Length is 25 to 35 mm.

**Nereis vexillosa** Grube

Johnson, 1901, p. 399, pls. 3, 4.

This is common at Second Sled Road, Perch Rock Point, and at Tomales Point, ocean side, in mussel and barnacle beds. Length is 80 to 150 mm.

**Nereis procera** Ehlers

Johnson, 1901, pp. 400-401, pls. 4, 5.

This occurs in mud flats of Tomales Bay. It is long, slender; color in life is light red. Length is 100 to 140 mm.

**Nereis mediator** Chamberlin

Chamberlin, 1919, p. 11.

This is common in algal holdfasts at Tomales Point, ocean side, and in the vicinity of Dillon Beach. It is often bright green in life and when preserved. Length is 50 to 70 mm.

**Nereis eakini** Hartman

Hartman, 1936, pp. 472-474, fig. 49.

At Tomales Point, ocean side, it occurs among Bryozoa and sponge masses. Length is 50 to 80 mm.

**Nereis latescens** Chamberlin

Chamberlin, 1919, pp. 10-11.

This is found at Perch Rock Point, in holdfasts of *Phyllospadix*, and in Tomales Bay, among algae, also at Tomales Point, ocean side. It is one of the smallest nereids in intertidal zones. It is usually associated with algal clumps. The anterior end is marked with characteristic dark patches and bars. Length is 25 to 40 mm.

**Nereis neonigripes** Hartman

Hartman, 1936, pp. 471-472, fig. 48.

An epitokous individual comes from Second Sled Road, another atokous one from Tomales Point, ocean side. Length is 50 to 80 mm. This may be only a subspecies or variety of *N. pelagica* Linnaeus.

Family **Glyceridae**

## KEY TO SPECIES

- |   |                           |
|---|---------------------------|
| 1. Parapodia provided with only composite setae . . . . .   |                           |
| . . . . .   | <i>Hemipodus borealis</i> |
| 1. Parapodia provided with simple setae above and composite setae below . . . . .                               | <i>Glycera</i> 2          |
| 2. Without branchiae . . . . .  | <i>G. tenuis</i>          |
| 2. With branchiae . . . . .   | 3                         |
| 3. With blisterlike, nonretractile branchiae on dorsal side of parapodia . . . . .                              | <i>G. robusta</i>         |
| 3. With retractile branchiae, from posterior face of parapodia, consist of palmately lobed structures . . . . . | <i>G. americana</i>       |

**Hemipodus borealis** Johnson

Johnson, 1901, pp. 411-412, pl. 10.

This occurs in muddy sand and sand mixed with gravel, in Tomales Bay, at Second Sled Road, and near the mouth of Stempell Creek. It is pale red in life. It is one of the smallest of the glycerids, length is 40 to 55 mm.

**Glycera robusta** Ehlers

Ehlers, 1868, pp. 656-658, pl. 24, figs. 31, 32.

In Tomales Bay and Bodega Lagoon, it is found in sand flats. Length is 150 to 300 mm.

**Glycera americana** Leidy

*G. rugosa* Johnson, 1901, pp. 409-411, pl. 10, figs. 101, 102.

Hartman, 1940, p. 246.

This is common in sandy mud flats of Tomales Bay. Length is 100 to 200 mm.

**Glycera tenuis**, new species

Plate 21, Figs. 23, 24

Hartman, in preparation, AHF.

Several individuals come from Dillon Beach, in fairly clean sandy beach. In size and general appearance this approaches *Hemipodus borealis* (see above), but its parapodia are provided with both simple and composite setae (pl. 21, fig. 23). Parapodial lobes have the posterior lobe entire and the presetal portion bilobed (pl. 21, fig. 23). The ventral cirrus is triangular, resembles the upper part of the presetal lobe; the dorsal cirrus is small, papillar.

The proboscis (everted) is covered with soft papillae. The aileron of the jaws is unique in being slender, tapering (pl. 21, fig. 24), suggesting the specific name.

This species is described more fully in another report (Hartman, in preparation, AHF).

*Holotype*.—AHF no. 62.

*Type locality*.—Dillon Beach, California, in sandy beach; intertidal.

*Distribution*.—Central California.

Family **Goniadidae**

## KEY TO SPECIES

1. Proboscis provided with a series of dark, V-shaped pieces (chevron) on either side, near its base . . . *Goniada brunnea*
1. Proboscis provided with many sharp, yellow teeth, resembling the radula of a mollusk . . . *Glycinde armigera*

**Goniada brunnea** Treadwell

Hartman, in preparation, AHF.

This comes from Tomales Bay, in muddy sand flats. Length is 50 to 70 mm.

### **Glycinde armigera** Moore

*G. multidentis* Hartman, 1940, pp. 249-251, pl. 44, figs. 126-131.

This occurs in Tomales Bay and Bodega Lagoon, in muddy sand flats. Length is 40 to 60 mm. This was earlier designated *G. multidentis* (Hartman, 1940, p. 249).

### Family **Eunicidae**

#### KEY TO SPECIES

1. Peristomium with a pair of dorsal cirri . *Eunice longicirrata*
1. Peristomium without dorsal cirri . *Marphysa stylobranchiata*

### **Eunice longicirrata** Webster

*E. biannulata* Moore, 1904, pp. 487-490, pls. 37, 38.

Hartman, 1944, pp. 141-146, pl. 6, figs. 118-122.

At Tomales Point, ocean side, this occupies fragile, gravel-covered tubes, on under sides of rocks. In life it is strikingly banded with red and white transverse lines; acicula and subacicular hooks are yellow. Prostomial antennae are articulate. Length is 50 to 80 mm.

### **Marphysa stylobranchiata** Moore

Moore, 1909, pp. 249-251, pl. 7, figs. 8-12; Hartman, 1944, p. 174.

At Tomales Point, ocean side, and at Second Sled Road, this is found in crevices of soft shale rocks. Length is 100 to 200 mm.

### Family **Onuphidae**

#### KEY TO SPECIES

1. Branchiae strongly spiraled; tube coarsely covered with debris, appears ragged, terminates distally in a lateral vent . . . . .  
. . . . . *Diopatra ornata*
1. Branchiae simple filaments; tube gray, mucoid, covered with a thin layer of fine sand . . . . . *Nothria iridescens*

### **Diopatra ornata** Moore

Moore, 1911, pp. 273-277, pl. 18, figs. 77-85; Hartman, 1944, pp. 72-74, pl. 1, figs. 15-20.

In Tomales Bay, at low-tide line, this is common in muddy sand flats. Tubes project a short distance above the surface. Length is 150 to 300 mm, but individuals are seldom taken whole, since autotomy is conspicuous.

### **Nothria iridescens** (Johnson)

*Nothria iridescens* Johnson, 1901, p. 408, pls. 8, 9.

Hartman, 1944, pp. 118-120, pl. 5, figs. 99-104.

This is found in muddy sand flats in Tomales Bay; it inhabits a thin, mucoid tube, externally covered with a thin layer of fine sand. Length is over 150 mm.

### Family **Lumbrineridae**

#### KEY TO SPECIES

1. Larger; anterior parapodia provided with simple hooks; usually reddish brown or with a green cast . . . *Lumbrineris zonata*
1. Smaller; anterior parapodia provided with composite hooks; usually pale pink or orange in life . . . *Lumbrineris latreilli*

### **Lumbrineris zonata** Johnson

Johnson, 1901, pp. 408-409, pl. 9, figs. 93-100; Hartman, 1944, pp. 202-204.

This is the commonest lumbrinerid in the vicinity of Dillon Beach. It occurs in the flats of Tomales Bay and Bodega Lagoon, also along sandy beaches or where sand is lodged in pockets behind large boulders. Length is over 100 mm.

### **Lumbrineris latreilli** Audouin and Edwards

Fauvel, 1923, pp. 431-432, fig. 171; Hartman, 1944, pp. 221-223, pl. 9, figs. 213-216.

At Tomales Point, ocean side, this occurs in rocky crevices. Length is 45 to 70 mm.

### Family **Arabellidae**

#### KEY TO SPECIES

1. Parapodia with a heavy projecting acicula; prostomium lacks eyespots; very long, threadlike . . . . . *Drilonereis nuda*
1. Parapodia without heavy projecting acicula; prostomium with transverse row of 4 eyespots near posterior margin; body thicker but also cylindrical . . . . . *Arabella iricolor*

**Arabella iricolor** (Montagu)

Fauvel, 1923, pp. 438-439, fig. 175; Hartman, 1944, p. 242.

At Dillon Beach, Tomales Bay and Tomales Point, this abounds in mussel beds and in rocky crevices, in gravel beds and among holdfasts. Length is 70 to 200 mm.

**Drilonereis nuda** Moore

Moore, 1909, pp. 254-256, pl. 8, figs. 21-23; Hartman, 1944, pp. 250-251, pl. 13, figs. 297-302.

At Tomales Point, ocean side, and at Second Sled Road, Dillon Beach, this occurs in holdfasts. It is very long and extremely slender. The proboscoidal armature lacks mandibles. Length is about 200 mm.

Family **Orbiniidae**

## KEY TO SPECIES

- |  |                           |
|--|---------------------------|
| 1. Prostomium anteriorly pointed, acute. . . . .                           | 2                         |
| 1. Prostomium anteriorly broadly rounded, spatulate . . . . .              |                           |
| . . . . .  | <i>Naineris laevigata</i> |
| 2. Ventral side of anterior end with transverse rows of papillae . . . . . |                           |
| . . . . .  | <i>Orbinia johnsoni</i>   |
| 2. Ventral side without transverse rows of papillae . . . . .              |                           |
| . . . . .  | <i>Scoloplos acmeceps</i> |

**Naineris laevigata** Grube

Fauvel, 1927, pp. 22-23, fig. 7.

In Tomales Bay, at Perch Rock Point and Second Sled Road, Dillon Beach, this occurs with boring clams and holdfasts; at Tomales Point it is in holdfasts of narrow-leaved eel grass. In life it is orange red with a brownish cast. Length is 80 to 150 mm.

**Scoloplos acmeceps** Chamberlin

Chamberlin, 1919, pp. 15-16.

This is very common in sand flats of Tomales Bay and Bodega Lagoon. It is orange red in life, and long, fragile, especially in posterior parts. Length is 100 to 200 mm. *Scoloplos elongata* Johnson (1901, p. 412) is another species and goes rightly to the genus *Haploscoloplos* Monro since it lacks uncini in thoracic neuropodia.

**Orbinia johnsoni** (Moore)

*Aricia johnsoni* Moore, 1909, pp. 260-262, pl. 8, figs. 30-33.

This occurs in clean sandy beaches at Dillon Beach; in life it is greenish with a red cast. Length is 60 to 90 mm.

**Family Spionidae****KEY TO SPECIES**

1. With a modified fifth setigerous segment, provided with heavy hooks . . . . . 2
1. Without such a modified segment . . . . . 5
2. Branchiae already present in front of modified segment . . . . . *Boccardia* 3
2. Branchiae not present in front of modified segment . . . . . *Polydora* 4
3. Posterior segments with strong, recurved hooks; branchiae present on anterior segments 2 and 3 . . . . . *B. uncatata*
3. Posterior segments without strong, recurved hooks; branchiae present on anterior segments 2, 3, and 4 . . . . . *B. proboscidea*
4. Branchiae few, first present from segment 10 or 11; tiny; boring in encrusting corallines . . . . . *P. giardi*
4. Branchiae numerous, first present from segment 7; larger; inhabiting mud flats . . . . . *P. brachycephala*
5. With a single pair of branchiae, these broad, foliose, inserted immediately behind paired palpi; second setiger with a dorsal membrane; inhabits soft tubes on mud flats; tiny . . . . . *Streblospio benedicti*
5. Without such branchiae or dorsal membrane . . . . . 6
6. Branchiae present from first setiger, continued throughout . . . . . *Spio*
6. Branchiae first present from second setiger . . . . . *Nerine cirratulus*
6. Branchiae first present much farther back . . . . . *Pygospio californica*

***Polydora brachycephala* Hartman**

Hartman, 1936, pp. 48-49, figs. 3-5.

In Tomales Bay and Bodega Lagoon this is common among and below beds of *Cirriformia spirabranca* (see below). Length is 30 to 50 mm.



### *Polydora giardi* Mesnil

Fauvel, 1927, p. 50, fig. 17; Hartman, 1941, p. 309, fig. 43.

Numerous individuals are referred to this species with some hesitation because they differ in their known habits from previous records. They inhabit the peripheral layers of encrusting coralline algae in intertidal zones, and are distinguishable at the surface of the matrix by a pair of minute apertures, marking anterior and posterior ends of the irregular, U-shaped burrow. They are frequently found with a cirratulid, *Dodecaceria fistulicola* (see below), but do not penetrate so deeply in the corallines.

Total length is 12 to 15 mm, but extraction from the algae usually results in imperfect specimens. There is no color on the body (preserved). The prostomium is moderately developed, anteriorly bifid, with 4 tiny black eyespots in trapezoidal arrangement between the palpal bases; they are easily overlooked because of their small size. The first setiger is provided with dorsal and ventral fascicles of setae, which are notably smaller than those following. The fifth (modified) setiger is provided with a dorsal fascicle of heavy hooks accompanied by an equal number of pennoned setae and a ventral fascicle of fine capillary setae. The modified hooks of this segment number about 4 pairs; they are thick, yellow, with a strong, falcate fang and a thick, thumblike accessory tooth in the concave portion. On worn hooks the distal fang and accessory tooth may be almost missing.

The sixth setiger and all notopodia of succeeding segments are provided with only capillary setae. Neuropodia from the seventh segment have hooded hooks, numbering usually 2 or 3 in a fascicle, and with or without a ventralmost seta. Branchiae are first present from the tenth or eleventh segment, consist of few pairs; they are continued posteriorly to about the twenty-ninth segment. The pygidium is a thick, white, collarlike ring, with middorsal notch; it is only slightly wider than the last body segment and over twice as long.

These individuals might easily be mistaken for *P. armata* Langerhans reported from southern California (Hartman, 1941, p. 306) because of their similarity in habitat. Both bore in encrusting coralline algae in intertidal zones, but in *P. armata* the last few segments are provided with special fascicles of spines and the modified hooks of the fifth setiger have a heavy flange.

### *Boccardia proboscidea* Hartman

Hartman, 1940, pp. 382-387, fig. 1; 1941, pp. 299-304, pls. 46, 47.

In Tomales Bay and Bodega Lagoon, and near the mouth of Stempell Creek, this is common in narrow, oblique or vertical crevices and burrowing in soft shales. Length is 25 to 45 mm.

**Boccardia uncata** Berkeley

Berkeley, 1927, p. 418, pl. 1, figs. 9-13; Hartman, 1941, pp. 290, 304, pl. 48, fig. 46.

At Tomales Point, ocean side, a posterior fragment was taken. Length is over 25 mm.

**Nerine cirratulus** (delle Chiaje)

Fauvel, 1927, p. 36, fig. 11; Berkeley, 1932, pp. 313-314.

Several individuals were taken in Tomales Bay, in muddy sand flats. Length is over 40 mm.

**Pygospio californica** Hartman

Hartman, 1936, pp. 50-51, figs. 17-19.

This occurs commonly in clean sandy beaches at Dillon Beach; in life it is dull green. Length is 15 to 25 mm.

**Spio**, sp.

Fauvel, 1927, p. 43.

This was taken in Tomales Bay, at middle low-tide line.

**Streblospio benedicti** Webster

*S. lutincola* Hartman, 1936, pp. 45-46, figs. 1, 2.

In Bodega Lagoon, this is very common at the surface at moderately low water line. It inhabits soft, limp tubes near the surface of the mud flats, but is apt to be overlooked because of its minute size. Length is 8 to 15 mm.

Family **Magelonidae****Magelona pitelkai**, new species

Plate 19, Figs. 1-9

Several specimens were taken in Tomales Bay, another in Bolinas Bay. The body is long, slender, depressed cylindrical, as typical of the genus. Length of 54 segments (posteriorly incomplete) is about 35 mm (preserved). Anterior and posterior regions are not sharply set off from one another by a constriction, and the ninth segment is not conspicuously different from the others. The prostomium is large, flat, spatulate, broader than anterior segments; it has a broadly rounded frontal margin, without frontal horns; on its dorsal surface there are double longitudinal ridges medially (pl. 19, fig. 1). There are no eyes or other pigment marks. The proboscis (everted in some individuals) is a great, spherical, smooth sack. The paired palpi are long, papillated, as typical of the genus.

Parapodia, in the anterior region, are provided with elongate, papillar, dorsal and ventral cirri, and a single, larger, triangular, postsetal lamella in the notopodium; a fifth parapodium is as shown in pl. 19, fig. 2. They have numerous slender, pointed setae, the neuropodial fascicle much smaller than, though similar to, the notopodial one. The ninth segment is only about two thirds as long as the eighth; it has dense fascicles of setae, nearly encircling the body at the sides, but leaving exposed a median space dorsally and ventrally. Its setae are of 2 kinds in each ramus. A few distalmost are longer, slenderer, with narrow wings (pl. 19, fig. 7). Most of them are shorter (pl. 19, fig. 4) and have a subdistal, expanded wing with weakly crenulate margin and attenuate tip; neurosetae (pl. 19, fig. 6) resemble notosetae (pl. 19, fig. 5).

The tenth setigerous segment is only about two thirds as long as the ninth, but as long as each of the next 4 segments. It and the following segments are provided with broad, foliaceous, interramal lamellae (postsetal in position) and dorsal and ventral cirri similar to, but smaller than, those in front. Hooded uncini occur in spreading fascicles (pl. 19, fig. 3); they are distally tridentate, the basal tooth large, the distal paired (pl. 19, fig. 8), to be seen clearly only in frontal view (pl. 19, fig. 9).

*M. pitelkai* has the following combination of characters: the prostomium is anteriorly rounded and dorsally grooved; parapodia are provided with foliaceous lobes; setae of the ninth segment are flattened subdistally; uncini are tridentate. *M. papillicornis* Müller (Fauvel, 1927, pp. 64-65) also has enlarged parapodial lobes, tridentate hooks, and broad setae in the ninth segment, but the prostomial lobe and parapodial structures have different proportions, and the special setae of the ninth segment are distally mucronate, not crenulate.

*M. pitelkai* inhabits muddy, sandy flats in low intertidal zones; the substratum consists of smooth, fine-grained particles, probably little disturbed by tidal action. Although soft bodied, species of this genus construct no tube; they burrow through the substratum using the enormous spatulate prostomium for digging. It is a pleasure to dedicate this species to Dr. Frank A. Pitelka, who collected most of the specimens from Tomales Bay, California.

*Holotype*.—AHF no. 55.

*Type locality*.—Tomales Bay, northern end; at low water line.

*Distribution*.—Tomales and Bolinas bays, California.

Family **Chaetopteridae****Phyllochaetopterus prolifica** Potts

Potts, 1914, pp. 972-978, fig. 11, pls. 4, 5.

This occurs at Tomales Point, ocean side, and at Dillon Beach, on under sides of rocks and in rocky coves at low water line. It forms tangled masses of very slender, more or less translucent, irregularly ringed, long tubes, from which the occupants are removed with difficulty. Length is over 60 mm.

Family **Cirratulidae**

## KEY TO SPECIES

1. Very dark in life; constructing calcareous matrices; anterior end provided with few (6 to 16) tentacles . . . . .  
 . . . . . *Dodecaceria fistulicola*
1. Orange red to brownish in life; not associated with limestones; anterior end provided with many crowded tentacles . . . . . 2
2. Prostomium with a row of eyespots on either side; dorsal branchiae and setigerous lobes begin at about the same anterior segment . . . . . *Cirratulus cirratus*
2. Prostomium without eyespots; dorsal branchiae arise from segment posterior to the first few setigerous segments . . . . . 3
3. Neuropodia in middle and posterior body segments with one (or 2) large, dark, slightly curved spine; inhabits rocky, oblique crevices, or associated with stones . . . *Cirriformia luxuriosa*
3. Neuropodia in middle and posterior body segments with inconspicuous rows of 4 or more yellow spines; inhabits sandy or muddy coves . . . . . *Cirriformia spirabranchia*

**Dodecaceria fistulicola** Ehlers

*Sabella pacifica* Fewkes, 1889, pp. 132-133, pl. 7, figs. 1, 2 (not Grube, 1856).

Ehlers, 1901, pp. 186-188, pl. 25, figs. 5-9.

*D. pacifica* Moore, 1909, pp. 268-270, pl. 9, fig. 44.

At Tomales Point, ocean side, this occurs in coralline algal masses; it also constructs massive limestone matrices. Fewkes' name (1889) is preoccupied by Grube (1856); the next available name is that of Ehlers (1901). Length is 25 to 40 mm.

**Cirratulus cirratus** (O. F. Müller)

Fauvel, 1927, p. 94, fig. 33.

A few individuals were taken at Second Sled Road, Dillon Beach. Length is 40 to 65 mm.

**Cirriformia spirabrancha** (Moore)

*Cirratulus spirabranchus* Moore, 1904, pp. 492-493, pl. 38, figs. 26, 27.

This is common in Tomales Bay and Bodega Lagoon, in muddy sand flats. Color in life is greenish yellow to light brown. Length is 60 to 100 mm. Individuals from Bodega Lagoon appear different from others in that they are smaller and darker; also the cardiac body harbors the sporozoite stage of a gregarine.

**Cirriformia luxuriosa** (Moore)

*Cirratulus luxuriosus* Moore, 1904, pp. 493-494, pl. 38, figs. 28-31.

This is common at Dillon Beach and Tomales Point, in oblique, rocky crevices, at moderately low water line. Color in life is drab yellow to reddish brown. Length is 60 to 100 mm.

Family **Capitellidae**

## KEY TO SPECIES

1. Thorax consists of 14 segments, of which 13 have setae; some abdominal segments provided with composite branchiae that are retractile . . . . . *Dasybranchus lumbricoides*
1. Thorax consists of 12 segments, of which 11 have setae; without branchiae . . . . . *Notomastus* 2
1. Thorax consists of 11 segments, of which segments 2 to 5 have pointed setae only, segments 6 to 11 have long-handled hooks . . . . . *Mediomastus californiensis*
2. Larger, robust; abdominal segments with conspicuous lateral organs between notopodia and neuropodia . . . . . *N. magnus*
2. Smaller, extremely attenuate; abdominal segments without conspicuous lateral organs . . . . . *N. tenuis*

**Dasybranchus lumbricoides** Grube

Fauvel, 1927, pp. 148-149, fig. 52.

Many individuals were collected in Tomales Bay; it is common in low water mud flats. In life it is bluish red, and thick though fragile. Length is 80 to 150 mm.

**Notomastus magnus** Hartman

Hartman, in press, AHF.

This occurs in Tomales Bay, in sand flats off Pelican Point. It is bluish red in life, and intermediate in size and thickness between *Dasybranchus lumbricoides* (above) and the very slender *N. tenuis* (below). Length is 70 to 100 mm. It is described in another report (Hartman, in press, AHF).

**Notomastus tenuis** Moore

Moore, 1909, pp. 277-278, pl. 9, fig. 55.

*N. angulatus* Chamberlin, 1919, pp. 16-17.

This is very common in sand and mud flats over a wide range of intertidal area, including Tomales Bay, Bodega Bay, Tomales Point, ocean side, and in holdfasts of *Phyllospadix*. It is bluish red in life, and very long, extremely slender, attenuate, fragile. It is readily distinguished by its color from another fragile species, *Scoloplos acmeceps* (see above), with which it sometimes occurs. Length is 100 to 250 mm. I am unable to distinguish *N. tenuis* from *N. angulatus* Chamberlin (1919). Among large collections the relative rugosity of segments and the degree of thickness of thorax and abdomen show all possible gradations.

**Genus MEDIOMASTUS**, new genus

The thorax consists of 11 segments, including a well-developed, achaetous peristomial ring; segments 2 to 5 have pointed limbate setae only, and segments 6 to 11 have long-handled uncini. The abdomen has numerous segments, provided with long-handled uncini only. It differs from *Heteromastus* Eisig in having 11, instead of 12, thoracic segments, and in lacking the reticulations on the cuticle; it differs from *Capitomastus* Eisig in having normal hooks on the last segments and in lacking the heavy, copulatory hooks on the last thoracic segments.

Type of the genus is *N. californiensis*, new species.

**Mediomastus californiensis**, new species

Plate 26, Figs. 64, 65

Hartman, in press, AHF.

Length attains 25 mm; width is less than 1 mm. This is a very slender, threadlike form, thickest in the region of the second and third setigers; it consists of 100 or more segments, each of which is about as long as, or longer than, wide, save the first few rings. Segments are typically unannulate except for ridges that mark the setigerous processes. The long posterior end, including most of the abdominal segments, is more or less closely coiled in fixative, but the single segments are moniliform.



The prostomium has an elongate palpode at its anterior end, followed by a depressed ring (pl. 26, fig. 65). The first (peristomial) achaetous segment is longer than wide and exceeds in length the first setiger (pl. 26, fig. 64). The next 4 segments (second to fifth) are provided with only capillary setae (pl. 26, fig. 64), including 10 to 14 setae in a fascicle. The next 6 segments (sixth to eleventh) are provided with uncini (pl. 26, fig. 66), including 10 to 12 in a fascicle. The thoracic hooks are long, those of the first few segments may extend distally almost as far as the pointed setae. Dorsal hooks of the tenth and eleventh segments are dorso-lateral in position but not modified as a copulatory apparatus. The thoracic segments increase in length, gradually, from second to eleventh.

Demarcation between thorax and abdomen is not distinct except for a change in the epithelium from a wrinkled appearance to one that is smooth, and the abdominal segments are more or less coiled. The first abdominal segment is shorter than those immediately following (pl. 26, fig. 64), but there is a gradual decrease in length farther back, so that they come to be shorter than wide. Uncinigerous tori are somewhat inflated but not conspicuous; they are provided with about 6 to 12, long-handled hooks that extend distally beyond the parapodia only slightly. Tori near the posterior end are more prominently elevated, but nowhere conspicuous. The proboscis is a soft, glandular sack, with widely scattered, low papillae (partly everted in pl. 26, fig. 65).

*M. californiensis* inhabits sandy mud flats, at low water line, sometimes associated with *Notomastus tenuis* (above).

*Holotype*.—AHF no. 63.

*Type locality*.—Tomales Bay, California, at low-tide line.

*Distribution*.—Marin and San Mateo counties, California; in mud flats.

### Family Maldanidae

#### *Axiothella rubrocincta* (Johnson)

*Clymenella rubrocincta* Johnson, 1901, p. 418.

Monro, 1937, p. 310.

This is the only maldanid known to occur in intertidal zones of central California. It is a host of a commensal crab, *Pinnixa longipes* (Lockington). It is relatively abundant on the Tomales Bay flats, inside Sand Point, above beds of *Phoronopsis*, at midtide line, though not uniform in its occurrence at this level. It occurs at all lower intertidal levels, but only a few, scattered individuals are to be found. It is rare, at low tide, in mud among rocks above Dillon Beach. (Distribution record is from Dr. F. A. Pitelka.) Length is 100 to 150 mm.

Family **Opheliidae**

## KEY TO SPECIES

1. Some parapodia provided with elongate cirri or also other sensory structures . . . . . 2
1. Parapodia reduced throughout, without special sensory structures; body spindle shaped, resembles small *Amphioxus* . . . . .  
. . . . . *Polyophthalmus pictus*
2. Body spindle shaped; without a ventral, longitudinal groove; with dark eyespots between some successive parapodia . . . . .  
. . . . . *Armandia bioculata*
2. Body thicker; with a ventral, longitudinal groove; without dark eyespots between successive parapodia . . . . . 3
3. A sharp constriction between head and thoracic region; a pair of conspicuous lateral ridges between the prebranchial and branchial regions . . . . . 4
3. Without a sharp constriction between these regions; without thick, lateral ridges between prebranchial and branchial regions; posterior end terminates in a pair of thick, digitate lobes ventrally and numerous slenderer lobes dorsally; usually with about 20 pairs of cirriform branchiae . . . . . *Ophelia limacina*
4. Some parapodia provided with a pair of cirriform branchiae in addition to dorsal cirri . . . . . *Thoracophelia mucronata*
4. Some parapodia provided with branched branchiae in addition to dorsal cirri . . . . . *Pectinophelia* 5
5. With usually 15 pairs of pectinately branched branchiae . . . . .  
. . . . . *P. dillonensis*
5. With usually 16 pairs of irregularly, pinnately branched branchiae . . . . . *P. williamsi*

***Polyophthalmus pictus* Dujardin**

Fauvel, 1927, p. 137, fig. 48.

This occurs throughout areas in the vicinity of Dillon Beach, along rocky shores. It is especially abundant just below the *Fucus* zone, at moderately low water line, among algae. It resembles a minute *Amphioxus*. Length is 10 to 20 mm.



**Armandia bioculata** Hartman

Hartman, 1938, p. 105, figs. 51-54.

This is found among algal growths on outer rocks, at low water line, at Tomales Point and at Dillon Beach. It is distinguished through its 11 pairs of lateral eyespots, between setigers 6 and 17, its anal cirri consisting of 5 smaller above and 2 larger below. Length is 12 to 20 mm.

**Ophelia limacina** Rathke

Fauvel, 1927, p. 132, fig. 46.

This occurs at Tomales Point, in sands on the outer side. In life it is iridescent blue. Length is about 30 mm.

**Thoracophelia mucronata** (Treadwell)

*Ophelina mucronata* Treadwell, 1914, pp. 218-219, pl. 12, figs. 37, 38.  
Hartman, 1938, p. 102.

This occurs at Dillon Beach, in pure sandy beaches, sometimes associated with *Pectinophelia williamsi* (below), and was found as high as the 5+ ft. tidal level by T. L. Rodgers, while surveying a strip of sandy beach near Perch Rock Point. Number of branchiae is 18 pairs. Length is 63 to 97 mm.

Originally described from southern California, *T. mucronata* has since been reported from the west coast of Vancouver Island (Berkeley, 1932); in addition, it has been collected from areas between San Diego, California, north to western Oregon.

Genus **PECTINOPHELIA** Hartman

This genus has the following in common with *Thoracophelia* (above). The prostomium and first 2 setigers are set off from the rest of the body by a constriction. There are heavy lateral ridges at the side, between the tenth and eleventh setigers; the anus is surrounded by a large, broad, triangular ventral lobe and a pair of lateral fringes. It differs in that the branchiae have lateral pinnæ instead of being cirriform, and parapodia are less developed. Four species, of which 2 are Japanese, have been referred to it (Hartman, 1938, p. 107); 2 others are known only from Dillon Beach (below).

**Pectinophelia williamsi** Hartman

Hartman, 1938, p. 109, figs. 62, 63.

This was collected in quantity from the sandy beach at Dillon Beach, at moderately high water line, during the summer of 1941, by T. L. Rodgers, while making a transect of the area. Mr. Rodgers found also

that between Perch Rock Point and the mouth of Andrews Creek individuals were entirely *P. williamsi*, whereas to the south of this point they were largely this species but included also some *P. dillonensis* (below), and that the proportion of the latter increased as one went southward along the beach. He found, further, that *P. williamsi* is on the whole a smaller species, measuring only 34 to 48 mm long. Some are sexually mature in June. Color in life is usually reddish purple.

### ***Pectinophelia dillonensis* Hartman**

Hartman, 1938, pp. 108-109, figs. 59-61.

This was collected in quantity from the sandy beach at Dillon Beach, at moderately high to medium water lines, by T. L. Rodgers and others, during the summer of 1941. It was associated with *P. williamsi* (above) in some beds, but most abundant just south of the mouth of Andrews Creek. Total length is 50 to 68 mm; the collection includes some that are sexually mature. Color in life is usually deeper bronze purple than that of *P. williamsi* (above).

## Family **Pectinariidae**

### KEY TO SPECIES

- Uncini with major teeth in single series of 4 only; tubes curved, constructed of moderately coarse, black and white sand grains; cephalic spines blunt, short . . . . *Cistenides brevicoma*  
 Uncini with major teeth in 2 series, number 4 or 5 in each longitudinal row; tubes nearly straight, constructed of fine, reddish sand; cephalic spines long, tapering . . . . .  
 . . . . . *Pectinaria californiensis*

### ***Cistenides brevicoma* (Johnson)**

Hartman, 1941, pp. 331-332, pl. 50, figs. 13, 14, 16, pl. 52, fig. 23.

This was collected occasionally in sandy mud flats of Tomales Bay and Bodega Lagoon. Tubes are somewhat curved, constructed of coarse, dark gray sand grains, and flare toward their anterior end. They measure 40 to 52 mm long.

### ***Pectinaria californiensis* Hartman**

Plate 21, Figs. 25-27

Hartman, 1941, pp. 333-335, pl. 49, figs. 1-6, pl. 52, fig. 21.

This was common in muddy sand flats of Bodega Lagoon, at low water line; others come from Tomales Bay. Tubes are nearly vertical

in the sand, the posterior end projects slightly above the surface of the beach. Tubes are trim, long conical, measure 60 to 65 mm long; they are nearly straight, constructed of fine sand particles that are gray with a reddish cast. Individuals measure 35 mm or over, thus are larger than those originally described from southern California. Number of setigerous segments is 17, but the last one is so reduced as to be easily overlooked; number of uncinigerous segments is 13. Cephalic spines are brassy yellow, number 12 to 13 on a side; they taper to fine points distally, are somewhat flattened; those near the middle of the series are thickest, and they gradually become slenderer toward the end of each series. Their distal, free ends are usually straight, not coiled, as in the southern representatives. Scaphal hooks are yellow, number 12 to 13 on a side; they terminate in a rounded hook (pl. 21, fig. 27) but are less curved than in the type. The anal plaque (pl. 21, fig. 25) is weakly lobed at its lateral margins, and the anal tongue (pl. 21, fig. 26) near its posterior end has a crenulate margin and a median papilla. Uncini, in lateral view, show 5 teeth, but in frontal view they may be seen to be disposed in double rows.

### Family Sabellariidae

#### KEY TO SPECIES

- Operculum forms a black cone; opercular stalk marked with oblique dark streaks . . . . . *Phragmatopoma californica*  
 Operculum yellow, spinous; opercular stalk marked with blotches of dark pigment . . . . . *Sabellaria cementarium*

#### *Phragmatopoma californica* (Fewkes)

*Sabellaria californica* Fewkes, 1889, pp. 130-132, pl. 7, figs. 3, 4; Moore, 1909, pp. 293-294, fig. 6.

This occurs at Tomales Point and Dillon Beach, among rocks at low water line. It constructs firmly concreted tubes of sand over hard surfaces. Eggs are purple in mass. Length is 40 to 60 mm.

#### *Sabellaria cementarium* Moore

Moore, 1906, pp. 248-253, pl. 12, figs. 45-51.

At Tomales Point and Dillon Beach, this occurs in rocky habitats, at low water line. It constructs tubes of sand, firmly concreted together. It is common, though usually at a lower level than *Phragmatopoma californica* (above). Eggs are bright pink in mass. Length is 50 to 65 mm.

Family **Ampharetidae**  
**Schistocomus hiltoni** Chamberlin

Chamberlin, 1919, pp. 17-18.

At Tomales Point, ocean side, this inhabits sand- and debris-covered tubes, on under sides of rocks or in crevices. It is characterized by its branchiae which include a pair of simple, cirriform, and several pairs of pinnately branched structures. Length is 25 to 50 mm.

Family **Terebellidae**

KEY TO SPECIES

- |  |   |
|--|---|
| 1. Uncini absent from thorax, or, if present, arranged in a single row . . . . .   | 2 |
| 1. Uncini in thorax in double rows <sup>1</sup> from the eleventh segment . . . . .  | 4 |
| 2. With 3 pairs of branchiae, consisting of numerous filaments . . . . .   | 3 |
| . . . . . <i>Thelepus crispus</i>  |   |
| 2. Without branchiae . . . . .   | 3 |
| 3. Uncini absent; prostomial lobe greatly prolonged as a long flap with 3 lobes . . . . .                                      | 3 |
| . . . . . <i>Amaea occidentalis</i>  |   |
| 3. Uncini present; prostomium not so prolonged . . . . .   | 3 |
| . . . . . <i>polycirrus</i>  |   |
| 4. Without branchiae; peristomium with transverse rows of minute eyespots . . . . .  | 4 |
| . . . . . <i>Spinosphaera oculata</i>  |   |
| 4. With a single pair of branchiae, these somewhat branched (pl. 21, fig. 29); with 13 thoracic setigers . . . . .             | 4 |
| . . . . . <i>Ramex californiensis</i>  |   |
| 4. With 2 pairs of branchiae, these richly branched; with 24 or more thoracic setigers . . . . .                               | 4 |
| . . . . . <i>Terebella californica</i>   |   |
| 4. With 3 pairs of branchiae . . . . .   | 5 |
| 5. Anterior end provided with conspicuous lateral lappets . . . . .  | 6 |
| 5. Anterior end without lateral lappets; with 17 thoracic setigers; greenish in life . . . . .                                 | 6 |
| . . . . . <i>Eupolymnia crescentis</i>   |   |
| 6. Thoracic uncini avicular (pl. 22, fig. 41) . . . . .  | 7 |
| . . . . . <i>Pista</i>   |   |
| 6. Thoracic uncini pectiniform (pl. 21, fig. 28); anterior end with 2 pairs of large lateral lappets . . . . .                 | 7 |
| . . . . . <i>Loimia montagu</i>  |   |
| 7. Large lappets on second branchial segment; tube with spongelike, reticulated top . . . . .                                  | 7 |
| . . . . . <i>P. elongata</i>   |   |
| 7. Large lappets on second and third branchial segments; tube with large overlapping membrane (pl. 25, figs. 61, 62) . . . . . | 7 |
| . . . . . <i>P. pacifica</i>   |   |

<sup>1</sup> See Fauvel, 1927, Fig. 89d, for illustration.

Subfamily **Amphitritinae****Terebella californica** Moore

Moore, 1904, pp. 496-498, pl. 38, figs. 36, 37.

At Tomales Point, ocean side, 2 specimens were taken by R. E. Paulson. It is pale red in life. Length is 60 to 80 mm, but the body is usually more or less coiled.

**Eupolymnia crescentis** Chamberlin

Chamberlin, 1919, pp. 265-266, pl. 3, figs. 6, 7.

In Tomales Bay this is common in muddy sand flats. Color in life is dull green with reddish cast. Length is 90 mm or over.

**Loimia montagui** (Grube)

Plate 21, Fig. 28

*Terebella montagui* Grube, 1878 (not Quatrefages, 1866, p. 361).  
Berkeley, 1941, p. 54.

In muddy sand flats of Tomales Bay this occupies fragile, chitinized tubes, covered with coarse sand or gravel particles. It is greenish in life, but has a bright red area along the conspicuous ventral thoracic scutes; it has 2 pairs of large lateral lappets at the anterior end of the thorax. Uncini have teeth in pectiniform arrangement, the thoracic uncini with 5 or 6 teeth, the abdominal with 6 (pl. 21, fig. 28) or 7 teeth. Length is 75 mm or over.

Although the specific name is preoccupied (see synonymy above), it seems unnecessary to apply a new name, since Grube's species has been referred to a different genus. This species has previously been reported from Elkhorn Slough (MacGinitie, 1935, p. 696) and from southern California (Berkeley, 1941, p. 54).

Genus **RAMEX**, new genus

Branchiae consist of a single pair, dichotomously branched several times. The peristomial ring has numerous eyespots. Anterior segments lack lateral lappets. Thoracic setigers number only 13. The first parapodium immediately posterior to the branchial ring is represented only by a papilla lacking setae. The first setiger has notosetae only; the next segment has a notopodial fascicle and uncinigerous torus. Setigers 3 and 4 have prolonged digitate, nephridial papillae, directed upward. Thoracic setae are distally smooth, narrowly bilimbate. Uncini are avicular, thick, with a major tooth and several rows of fine teeth. Thoracic uncini occur in single series on the first 6 tori, thereafter in alternating rows.

Type of the genus is *R. californiensis*, new species.

**Ramex californiensis**, new species

Plate 21, Fig. 29; Plate 22, Figs. 30-32

Several individuals come from Tomales Point, ocean side, some from Dillon Beach along the rocky shore, and numerous others were taken at Caspar and Moss Beach, San Mateo County, California. Total length of an ovigerous individual is about 15 mm. The body tapers posteriorly, is more or less terete, or only slightly coiled (preserved). The segments consist of 13 thoracic and about 21 abdominal setigers, or a total of 34. The prostomium is broadly rounded at its anterior margin but not prolonged. Tentacles are numerous, slender, grooved, only slightly coiled and twisted in retraction; they are of varying lengths, the posteriormost and lateralmost much the shortest.

The peristomial ring is easily made out by laying aside the single pair of branchiae. It is unadorned save for several rows of tiny dark eye-spots, more or less limited to its dorsal and dorsolateral portions. The first few segments increase rapidly in circumference. The branchial segment is a simple ring with the branchiae attached in a straight line on the dorsal side. The 2 of a pair are approximately similar, but the right one (in the type specimen) is slightly smaller than the other; the smaller one has 7 distal ends (pl. 21, fig. 29), the larger has 10, but they are similar in other respects.

The first parapodium is represented by a papilla, lacking setae, immediately behind the branchial segment. The next segment is provided with a setal fascicle, resembling those more posterior. Thoracic setae are continued posteriorly through only 13 segments. They are long, pointed, with entire margin, and narrowly bilimbate (pl. 22, fig. 32). Ventral uncini are present from the second setiger, continued thus through the sixth setiger; thereafter they occur in alternating series. They are avicular, with broad base, a single large tooth and 2 smaller rows of teeth distally (pl. 22, figs. 30, 31). Abdominal uncini resemble those in the thorax.

Color in life is pale red. The tube is coarse, with chitinized base, covered externally with algal and shell fragments.

*Holotype*.—AHF no. 64.

*Type locality*.—Tomales Point, Marin County, California.

*Distribution*.—Central California, intertidal.

**Pista elongata** Moore

Moore, 1909, pp. 270-272, pl. 9, figs. 45-47; MacGinitie, 1935, pp. 695-696, fig. 12.

At Tomales Point, ocean side, this occurs in rocky habitats. The characteristic spongelike top of the tube, and the long-branched branchiae clearly characterize this species. Length is 100 mm or over.



***Pista pacifica* Berkeley**

Plate 22, Figs. 37-41; Plate 25, Figs. 61, 62

Berkeley, 1942, p. 202, figs. 1-3.

Several individuals with tubes were taken from Tomales Bay, in muddy sand flats, at low water line; the top of a tube comes from Monterey, California, dredged from a few fathoms.

This is large, long, tapering distally, with a total length of over 37 cm; number of segments is over 300. The thorax consists of 17 setigerous segments, the second to seventeenth are also uncinigerous. Branchiae number 3 pairs, are large, conspicuous, each with a long, thick base and richly branched top; they diminish in size from the first to third pair, or the second may be about as large as the first.

The prostomium is broad, rounded, directed forward in front of the oral aperture. The lower lip, ventral to the oral aperture, consists of a pair of prolonged, triangular lobes with ruffled edges; they resemble lappets, but are united medially by a concave membrane. This segment is continued dorsally as a short, smooth segment, immediately behind the tentacle-bearing fold. No eyes or other pigment spots are visible. The first branchial ring is smooth, short except for a minute lappet ventrolateral in position. The second and third branchial segments each has a pair of broad, conspicuous lappets, longest at the dorsal ends. The following segments have no lobes. Ventral scutes are conspicuous through 10 setigers, thereafter low, narrow.

The first setigerous fascicle is small, located at the outer base of the third pair of branchiae. From the second the fascicles are large, broad, resemble those following. Notosetae are light yellow, long, pointed, narrowly bilimbate, with smooth edges. Uncini are first present from the second setiger, occur in single rows in the first 6 tori, thereafter in double rows. Those of the first series have a very long handle and terminate distally in a single large tooth (pl. 22, figs. 37, 38). Farther back they come to be gradually shorter handled and acquire a series of small teeth above the main fang (pl. 22, fig. 39). However, throughout the thoracic region they have a long handle; one from the fifteenth setiger is shown in plate 22, fig. 41. Abdominal uncini are short, with broad base (pl. 22, fig. 40).

Abdominal segments are smooth, with slight demarcation between successive rings; their tori are short on the first few segments, increase in length toward the midregion, but as the width of body diminishes they are gradually shorter and smaller. Neurosetae are seemingly absent from abdominal segments. Nephridial papillae are not visible save on the fourth to sixth setigerous segment, where they occur as a thick papilla on the posterior side of the setal fascicle.

The tube is characteristic; it consists of a long, cylindrical portion, 40 cm or longer by 20 mm wide; it has a flaring, distally tessellated top (pl. 25, figs. 61, 62) on one side, which neatly bends over the open end of the tube when the individual is retracted, but is capable of being pushed forward when the tentacles are extended. It consists of a thin, chitinized base covered over with a thin coat of fine, dark gray sand.

Color in life is pale flesh or somewhat reddish; tentacles are crossed by alternating pale and dark bands; branchiae are red.

*P. pacifica* is clearly separable from *P. elongata* (see above) in that the first has conspicuous lateral lappets on second and third branchial segments, whereas *P. elongata* has them only on the second branchial segment; the first has a tube with flaring, tessellated top, the second has a tube with spongelike, reticulated top. The description of *P. pacifica* Berkeley (1942) was received after the completion of this manuscript. It applies well to individuals from California; the original manuscript name was therefore suppressed. The type locality is Vancouver Island.

### Genus **SPINOSPHAERA** Hesse

#### Type **S. pacifica** Hesse

Branchiae are absent; anterior segments lack lateral lappets. Thoracic setae are present from the fourth segment, uncini from the fifth segment. Thoracic setae include longer and shorter ones, alternating with one another, both provided with flaring, denticulate tip, as typical of the subfamily Amphitritinae, but the subdistal swelling is here minutely and closely spinous. Uncini of the thorax and abdomen are of the same kind, those of the thorax in double rows on some segments; they have a major tooth below and several rows of fine teeth above. Thoracic setigerous segments are numerous, over 20. Only one species, *S. pacifica* Hesse (1917, p. 209) from Japan, has heretofore been referred to this unique genus.

### **Spinospaera oculata**, new species

Plate 22, Figs. 33-36

Several individuals were taken at Tomales Point, ocean side. Many others come from Caspar, Mendocino County, south to Moss Beach, San Mateo County. This is a long, slender, though much-coiled (preserved) species; it consists of about 41 thoracic and over 100 abdominal setigers. Its total length may attain 40 mm (preserved), its greatest width near the middle of the thorax is 2.25 mm and at the anterior end 1.5 mm. It greatly resembles species of *Polycirrus* in lacking branchiae, but lacks a large, shovellike prostomium and tangled mass of tentacles. The peristomial ring is provided with several irregular rows of dark eyespots.



Tentacles are numerous, coiled. The dorsum of the first 12 setigers is finely, transversely rugose. Large eggs, visible on the dorsal side through the body wall, are present from the fifteenth setiger. Nephridia may be seen as a thick swelling on dorsal sides of parapodia, one to each parapodium, from the second setiger.

Ventral scutes are large, broad, thick, on setigers 5 to 8, but up to the thirteenth they are still more or less conspicuous though much smaller; thereafter they are depressed (preserved).

Thoracic setae are of 2 kinds, including longer and shorter ones, both with pectinate ends and swollen, spinous, subdistal parts, but with very narrow, obscure wings below. The longer ones (pl. 22, fig. 34) number about 3 in a parapodium and alternate with the shorter ones (pl. 22, fig. 33) which number about 6 to 10 in a fascicle. Uncini of thorax and abdomen resemble one another; they are avicular, with large basal tooth (pl. 22, fig. 36) and many rows of tiny teeth in series above (pl. 22, fig. 35) forming a thick hook that does not readily lie flat.

*S. oculata* differs from *S. pacifica*, the only known species in the genus, in having numerous peristomial eyespots. Thoracic setigers number 40 or more as against 23, and thoracic setae have a broader flaring portion distally than in the first described species.

*Holotype*.—AHF no. 66.

*Type locality*.—Tomales Point, California, in rocky habitats; intertidal.

*Distribution*.—Central California.

### Subfamily **Thelepinae**

#### **Thelepus crispus** Johnson

Johnson, 1901, p. 428, pl. 17, figs. 175-178; Berkeley, 1942, p. 204.

At Tomales Bay, Dillon Beach, and Tomales Point, ocean side, this is the commonest terebellid. In life it is orange yellow, with bright red, filamentous branchiae. It occupies coarse, sand-covered, chitinized tubes, on under sides of shell fragments and stones. It often harbors a commensal polynoid, *Halosydna brevisetosa* (see above). Length is 70 to 120 mm.

### Subfamily **Polycirrinae**

#### Genus **POLYCIRRUS** Grube

##### **Polycirrus**, sp.

Representatives are to be found in rocky habitats of Tomales Point and Dillon Beach. They are typically small, delicate, fragile; they are usually bright red, very active in life, without tube or burrow. The anterior end consists of a large, long, shovellike prostomium with enor-

mous mass of tentacles, capable of unusual extension and retraction. Branchiae and eyespots are absent. There are many (over 20) setigerous segments, but the number is highly variable in known species. Uncinigerous tori are more or less completely absent from the thorax, the first pair is often indistinct and present in a far posterior segment. Ventral scutes are conspicuous in the anterior thoracic region, and sometimes deeply grooved. Notosetae are present from the second or third segment; they are smooth or spinous. Uncini are avicular, occur in single rows, usually have a prolonged basal portion terminating distally in a few large teeth. Individuals are commonly luminescent.

Species of the genus *Polycirrus* are in great confusion, at least partly because of the unknown range of variation within species. Only 2 have been reported from California—*P. californica* Moore (1909, pp. 276-277) from San Diego, and *P. perplexus* Moore (1923, pp. 198-199) off central California, in 10 to 281 fms. *P. californica* has about 28 setigerous segments, uncini are first present from the thirteenth setiger, and ventral scutes are large through the sixth segment. *P. perplexus* has about 40 setigerous segments, uncini are first present from the eighth setiger, and ventral scutes large through the eleventh. The range of any or all of these characters has not been ascertained. The number of setigerous segments among a group of individuals from Moss Beach to Dillon Beach ranges from 38 to only 19. Among these, only one individual has 38 setigers, 5 have 28, and 4 have 21 to 22. An examination of more material than is now available is necessary to determine whether they represent specific characters, and just what these individuals are.

### Genus AMAEA Malmgren

The anterior end is greatly prolonged forward, provided with many tentacles from its upper surface, including a modified, dilated kind limited to the dorsalmost ridge of the peristomial fold, and great numbers of slender, filiform ones attached to the peristomial fold at the sides and around the oral aperture. The prostomial lobe is enormous. Branchiae and eyespots are absent. The thoracic region has parapodia reduced to papillar prolongations, provided with slender fascicles of fine setae; an anterior abdominal region lacks parapodial structures and is followed by a region in which setal fascicles are reduced to slender uncini. All setal structures are inconspicuous and typically deeply embedded.

Only 3 species have been attributed to this genus. They are *A. trilobata* (Sars) from northern, western, and southern Europe (Fauvel,

1927, pp. 285-286), *A. accraënsis* Augener (1918, pp. 561-562) from the African Gold Coast, and *A. antipoda* Augener (1926, pp. 241-242) from New Zealand. *A. occidentalis*, new species, is the first record of this genus from the Western Hemisphere.

#### KEY TO SPECIES

1. With 10 anterior setigerous segments . . . *A. trilobata* (Sars)
2. With 11 anterior setigerous segments . . . *A. antipoda* Augener
3. With 11 left, 13 right, anterior setigerous segments . . . . .  
 . . . . . *A. accraënsis* Augener
4. With 12 anterior setigerous segments . . . *A. occidentalis*

#### *Amaea occidentalis*, new species

Plate 26, Figs. 66, 69

Two nearly complete, well-preserved individuals were collected at Inverness, Tomales Bay, during the summer of 1935; another was found in Bodega Lagoon, in June, 1941, by T. L. Rodgers. In the largest one, the body is coiled, but its total length attains about 50 mm; the greatest width, in the anterior thoracic region, is 6 mm. The anterior end is concealed by the innumerable tentacles, but the prostomium is easily discerned, on the ventral side, as a great spatulate lobe (pl. 26, fig. 66). The peristomial ring forms the lower lip; its lateral and dorsal portions are the base of attachment for the 2 kinds of tentacles. Its ventral portion is broad, weakly trilobed (pl. 26, fig. 66); this is continued laterally as a full, folded membrane, to which many slender tentacles are attached. The lateral portions are more or less separated from the dorsolateral and dorsal portions. The former is also provided with many slender tentacles, and the dorsal portion is a crescentic area to which the broadly dilated, large tentacles are attached. The slender tentacles obviously function for food-getting, since they immediately surround the oral aperture. The larger tentacles, attached along the base of the dorsal side of the prostomium, may function for cleaning the slender tentacles, suggested by the deep groove (pl. 26, figs. 68, 69) on their ventral side.

Dorsal and ventral sides of the first 9 or 10 segments are closely covered with fine, low papillae, but they do not conceal the shallow, intersegmental furrows (pl. 26, fig. 66). Thereafter the epidermal surface comes to be increasingly smoother, translucent, and continues so to a far posterior region, where it comes to be increasingly rugose.

The first 12 segments are clearly distinguished, since they are provided with laterally projecting parapodia; thereafter the separation from one segment to the next is made out with difficulty, except in the posterior region, where intersegmental furrows are again distinct and uncinigerous tori somewhat elevated. The neural groove (pl. 26, fig. 66) is depressed throughout.

The first 3 pairs of parapodia are elongate, papillar, increase in size from the first; their setae emerge as distinct, fan-shaped fascicles from the distal end of the papillar notopodium (pl. 26, fig. 67); a second has 15 or more fine, pointed setae and a minute nephridial papilla near the ventral base. From the fourth (pl. 26, fig. 67) to twelfth setiger notopodia are thicker and longer, but the setae project only a short distance, as in the first few pairs. They come to have 20 or more setae in a fascicle. An obscure, opaque white, circular plaque, from which the nephridial papilla arises, can be seen at the ventral base of the third; by the fourth it is more conspicuous and continues so through 4 segments, but by the eighth it is smaller and by the ninth, absent. The nephridial papilla, however, is present on all 12 thoracic setigers. Nephridia of the first 3 setigers are greatly prolonged internally, increasing in length from first to third, but by the fourth they are very much shorter. The transition from third to fourth is shown in pl. 26, fig. 67.

Abdominal setigers number at least 33, but between this setigerous region and the thoracic one there is a smooth, asetigerous length, about equaling the length of 5 or 6 abdominal segments. Abdominal parapodia are small, short, inconspicuous, from which the uncini project slightly; they number 4 or 5 in a fascicle, are long, spindle shaped, taper distally to blunt points, and are seemingly not at all hooked.

A broken individual from Bodega Lagoon consists of anterior and posterior ends, is torn in the middle, has 12 thoracic segments, 6 segments lacking setae and 47 abdominal setigers; it may be complete.

*A. occidentalis* is unique in having 12 thoracic setigers, at least 33 (perhaps 47) abdominal setigers, and an intermediate zone of perhaps 6 segments.

*Holotype*.—AHF no. 69.

*Type locality*.—Inverness, Tomales Bay, California, in mud flats.

*Distribution*.—Central California, intertidal.

## Family Sabellidae

### KEY TO SPECIES

- |   |   |
|---|---|
| 1. Thoracic collar entire, with a single incision middorsally . . . | 2 |
| . . . . . <i>Chone</i>  |   |
| 1. Thoracic collar with lateral, or also ventral, incision . . .    | 3 |

- |   |                        |   |
|---|------------------------|---|
| 2. Minute; thoracic spatulate setae with a mucron (pl. 23, fig. 52); inhabits shell-covered tube . . . . .  | <i>C. minuta</i>       |   |
| 2. Large, robust; thoracic spatulate setae lack mucron (pl. 23, fig. 47); inhabits thin, sand-covered tube . . . . .  | <i>C. mollis</i>       |   |
| 3. Thoracic inferior notosetae spatulate (pl. 23, fig. 43) . . . . .  |                        | 4 |
| 3. Thoracic inferior notosetae broadly limbate (pl. 23, fig. 42) . . . . .  | <i>Sabella media</i>   |   |
| 4. Base of tentacular crown spiraled, inrolled on ventral side, so that radioles inscribe more than one whorl . . . . .   | <i>Eudistylia</i>      | 5 |
| 4. Base of tentacular crown not spiraled, each half of crown inscribing only a semicircle . . . . .   | <i>Pseudopotamilla</i> | 6 |
| 5. Tentacular radioles crossed by alternating bars of red and white; dorsal edge of tentacular base not cleft . . . . .   | <i>E. vancouveri</i>   |   |
| 5. Tentacular radioles deep maroon, with pale or orange tips; dorsal edge of tentacular base deeply cleft . . . . .   | <i>E. polymorpha</i>   |   |
| 6. Larger; dorsal edge of tentacular base deeply cleft; tentacular eyespots number usually several on a radiole where present; usually highly colored in life . . . . . | <i>P. ocellata</i>     |   |
| 6. Tiny; dorsal edge of tentacular base not cleft; tentacular eyespots usually one or few on radioles where present; usually white or pale in life . . . . .            | <i>P. socialis</i>     |   |

### **Chone mollis** (Bush)

*Metachone mollis* Bush, 1904, p. 216, pl. 35, figs. 19, 20, 28.

Hartman, 1942, p. 87, figs. 141-143.

Many individuals were taken from Tomales Bay, in sandy mud flats. This is a stout, robust species (Hartman, 1942, p. 87). Larger individuals consist of about 65 setigers and measure 63 mm long, including the crown, which measures about 12 mm long (somewhat rolled inward). Segments are neatly uniannulate, but have a faint transverse groove about midway across each segment. The tentacular crown has a deep palmate membrane, extending well over half the length of the radioles.

The first setiger has a small, papillar notopodium, provided with a reduced fascicle of pointed setae. Farther back, both notopodium and neuropodium are well represented. Spatulate thoracic setae are distinctly without mucron, usually with a dimple at the distal end (pl. 23, fig. 47); all resemble one another. Thoracic uncini have a long, major tooth (pl. 23, fig. 48). Abdominal uncini are also characterized by a prolonged major tooth (pl. 23, fig. 49). Color in life is uniformly white or somewhat yellowish.



*C. mollis* was originally designated type and only species of the genus *Metachone* Bush (1904) and considered to have affinities with *Euchone* Malmgren and *Dialychone* Claparède, but, since *Euchone* is characterized by its peculiar caudal end and *Dialychone* by its abdominal uncini in which the secondary teeth are large, the affinities of *C. mollis* are undoubtedly with species of *Chone* Kröyer. *C. mollis* differs from *C. infundibuliformis* Kröyer, which is a larger species, and in life is often spotted reddish or somewhat greenish. Also, spatulate thoracic setae in the latter are gently rounded distally or have a minute mucron (pl. 23, fig. 44, based on an individual from the west coast of Sweden). Thoracic uncini have a comparatively thick major tooth (pl. 23, fig. 45), and abdominal uncini have a thick basal plate (pl. 23, fig. 46).

*C. mollis* constructs a closely fitting tube of mucus, externally covered with fine sand particles; the occupant leaves it readily when disturbed and can quickly reconstruct another. Originally described from Pacific Grove, it ranges in intertidal zones of the northeast Pacific.

### **Chone minuta**, new species

Plate 23, Figs. 50-52; Plate 24, Figs. 59, 60

Numerous individuals were taken at Dillon Beach, in holdfasts of algae and among compound ascidians. This is one of the smallest members of the genus. Total number of segments of sexually mature individuals (with large eggs in abdominal segments) includes 8 thoracic and 26 abdominal setigers; total length is about 10 mm, including the crown, which measures 2 mm. Segments are clearly annulate; those of setigers 2 to 6 show faint transverse grooves dividing the ring ventrally into 2 nearly equal parts; others are neatly uniannulate.

The tentacular crown (preserved out of the tube) is expanded, shaped like a bell, with barbless tips extending distally. There are 6 to 7 pairs of pinnate radioles on each side, together with 3 pairs of filamentous radioles at the dorsal ends of the crown (pl. 24, fig. 59). The barbed radioles are united at their bases by a palmate membrane that extends distally only about one third of the length of the radioles; the membrane is continued for some distance along the sides of the radioles but does not extend to the barbless distal portion. Each radiole has, on its oral side, about 24 pairs of barbs, in double rows. Palpi are elongate, triangular.

The collar is smooth, entire, straight, about as long as the first 2 setigerous segments together. On its ventral side, medially, it has a slight concavity, but extends around the peristomial ring as a trim collar to the middorsum, where it is cleft and inserted on the peristomial membrane. Eyespots are lacking.

The first setigerous ring is only about half as long as the second; it is provided with a papillar parapodium, from which a fan-shaped fascicle of 6 to 8 pointed setae emerge; the fascicle resembles those farther back but is more spreading; this ring lacks neuropodia. From the second, both notopodia and neuropodia are represented. The first are provided with longer, slender, pointed setae (pl. 24, fig. 60) superiorly and shorter, somewhat spatulate setae with a long, pointed mucron (pl. 23, fig. 52) inferiorly. A median thoracic notopodium has 7 or 8 longer setae, about 7 spatulate setae. Thoracic neuropodia are provided with only long-handled uncini in which the largest tooth is long (pl. 23, fig. 51); a median neuropodium has about 11 of these hooks. Abdominal parapodia have short uncini above and slender setae below. Uncini number about 8 in a series in the second abdominal segment; each has a long, main tooth (pl. 23, fig. 50) resembling that in thoracic hooks. Setae are pointed, limbate, number 8 or 9 in a fascicle.

The tube is slender, closely fitting the body of the occupant; externally it is covered with small shell fragments, attached usually on edge, so as to lie more or less in transverse layers. Tubes occur in crevices of sponge and ascidian clusters, and sometimes resemble the small bits of sand and shell sometimes lodged in these places. The tube may be only slightly longer than the length of its inhabitant. Color in life and preserved is pale to white.

*C. minuta* is characterized in its very small size, measuring only about 10 mm long; it has few abdominal segments, numbering only about 26; the tentacular crown has a low palmate membrane, only about one third of the total length of the crown, and there are only 6 or 7 pairs of radioles; spatulate setae have a long mucron.

*Holotype*.—AHF no. 67.

*Type locality*.—Dillon Beach, California, intertidal, in rocky habitats.

*Distribution*.—Central California.

### ***Pseudopotamilla ocellata* Moore**

Moore, 1905, pp. 559-562, pl. 37, figs. 8-14; Hartman, 1938, pp. 19, 25, 26, pl. 2, fig. 6.

Several individuals come from rocky crevices at Tomales Point, ocean side, and from Dillon Beach. The tentacular crown is usually brilliantly colored, transversely banded with red or maroon. The tube is typically slender but irregular, leathery, chitinized, covered with fine sand particles on the outside, and the distal end is transversely rolled up when the occupant is withdrawn. The dorsal edge of the tentacular base is deeply cleft (Hartman, 1938, pl. 2, fig. 6), and some radioles, especially those on the



dorsal side, have heavy, black eyespots, often 5 or 6 on a radiole. The collar consists of a pair of smaller dorsal lobes, separated from each other by a deep median cleft, and from the lateral lobes by a wide dorsolateral notch; it extends laterally and ventrally in a gradually rising membrane and terminates in oblique ventral lobes separated by a deep midventral incision. Length is 45 mm or over.

### ***Pseudopotamilla socialis*, new species**

Plate 24, Figs. 53-58

Many collections come from sponge masses at Tomales Point, ocean side, and fewer in ascidian clusters. Tubes radiate out from the sponge mass so that the distal ends project slightly from the surface of the sponge; when extended, individuals lie with the tentacular crown covering much of the surface of the sponge mass. Color in life and preserved is pale, or tinged with dusky pigment and there are dark eyespots on the radioles. Total length is only 20 to 25 mm, width about 1 mm in the thoracic region. Number of segments includes 6 to 8 thoracic and 50 or more abdominal segments.

The tentacular crown consists of about 8 pairs of radioles; they are entire, those on the ventral side are shortest, increasing gradually in length dorsally. Radioles are provided with a double row of pinnae, have only a short free end distally, as typical of the genus. Eyespots are variable, sometimes are totally lacking, or occur singly, or may number 4 or 5 on a radiole. They are usually limited to the lateral radioles, near their midlength. Eyes are large, dark brown, circular. The number and distribution of eyespots are highly variable in this species, as in some other sabellids (*Eudistylia*, below). The dorsal edge of the tentacular base is a short, thin, straight membrane.

The collar is 4 lobed; its dorsal portion consists of a pair of low, oblique flaps, widely separated from the lateral ones by a deep dorsolateral cleft; except at its medial portions it leaves much of the peristomium exposed. Lateral lobes rise abruptly above the dorsolateral clefts and continue ventrally to form high, oblique ventral flaps, their tips more or less prolonged, attenuate.

Ventral scutes are rectangular, broader than long, without markings or indications of transverse bisections at the sides. Abdominal segments are clearly marked, as long as broad, or shorter. The first thoracic setiger is provided, on each side, with a notopodial fascicle of 6 longer (pl. 24, fig. 54) and 7 shorter (pl. 24, fig. 55) bilimbate setae, disposed in 2 transverse rows. From the second, notopodia are provided with slender

bilimbate setae (pl. 24, fig. 53) above and short, spatulate setae (pl. 24, fig. 56) in 2 transverse rows below. Neuropodia are provided with an anterior row of pennoned setae and a posterior row of avicular hooks. Those of the first thoracic torus number about 20 sets, those of the second to third last thoracic segments number about 23 to 24 in a set, but in the last 2 thoracic tori the pennoned setae and their companion hooks (pl. 24, figs. 57, 58) are conspicuously fewer in number and larger, numbering only 8 or 9 sets in a series.

Abdominal segments are provided with a double row of bilimbate neurosetae with a long, slender point more nearly resembling those in the collar fascicle than those in other thoracic segments. Notopodia have single rows of avicular hooks like those in the thorax, but they are much shorter stemmed and smaller than those in front, and the comb region is thick, so that the hook does not readily lie flat.

Tubes are slender, closely fitting the occupant, externally covered with small fragments of sand and shell, attached to the tube more or less transversely.

*P. socialis* is characterized by its small size, its reduced number of radioles, its collar membranes, and its thoracic hooks, especially those of the last 2 thoracic segments. In the last respect it approaches *P. intermedia* Moore (1905, pp. 562-564, pl. 37), but the latter is a much larger species, its collar membrane has high dorsal lobes, and radioles are believed to be totally lacking eyespots.

*Holotype*.—AHF no. 68.

*Type locality*.—Tomales Point, Marin County, ocean side, in sponge among rocks; intertidal.

*Distribution*.—Central California.

### **Eudistylia polymorpha** (Johnson)

*Bispira polymorpha* Johnson, 1901, pp. 428-430, pl. 17, figs. 179-183, pl. 18, figs. 184, 185.

Hartman, 1938, pp. 18, 19, 23, pl. 2, fig. 5.

Several individuals were taken from rocky habitats at Tomales Point and Dillon Beach. In life the tentacular crown is typically deep maroon, tipped with pale yellow or deep orange. The dorsal edge of the tentacular membrane is deeply cleft (Hartman, 1938, pl. 2, fig. 5). The collar membrane is deep, much less oblique than in *E. vancouveri* (below). Tentacular eyespots are black, often conspicuous. Length is over 100 mm.

**Eudistylia vancouveri** (Kinberg)

Plate 25, Fig. 63

*Sabella vancouveri* Kinberg, 1867, p. 383.*E. gigantea* and *E. plumosa* Bush, 1904, pp. 210-212.

Hartman, 1942, p. 84.

Several very large individuals were seen in the muddy sand flats at Tomales Bay, and one completely removed by T. L. Rodgers; the tube of this individual is shown in pl. 25, fig. 63. It is tough, leathery, chitinized, long and cylindrical, and tapers basally, ending in a cone that is closed at the base. Tubes are solitary, and, so far as could be observed, widely scattered. Specimens are large, robust, well over 30 cm long, and the crown, when fully extended, is strikingly plumose, brilliantly banded with maroon and orange or yellow pigments. Tentacular eyespots are black, more or less conspicuous, but often lacking from a few or many radioles. The latter are usually entire, but rarely one or more are bifurcated near the base (as typical of species of *Schizobranchia* Bush). The dorsal edge of the tentacular base is a short, entire membrane. The collar is long, deep on its ventral side, but much shorter going upward; the dorsal lobes are rather low, widely separated from the lateral portions by deep clefts.

Two individuals, taken at Tomales Point on the ocean side, differ rather strikingly from typical *E. vancouveri* in their pigmentation pattern. One was removed, complete with tube, from rotten granite by John Copeland; another fragment was taken in a similar habitat by Dorothy E. Peters. In each of these the body in life was deep olive green overlaid with some red; preserved they are greenish tinged with brown. The tentacular crown has a spiraled base and rather short radioles, crossed with at most 5 or 6 maroon bars and alternating pale ones. Radioles are simple, may have 5 or 6 circular dark eyespots, irregularly disposed, sometimes all on one side (toward the dorsum) near the middle of the radiole, or some are also ventral, but many radioles lack eyespots. The dorsal edge of the tentacular base is nearly straight, but there is a slight elevation near its distal portion. Ventrally the tentacular base is rolled in, spiraled.

The dorsal collar lobes are low, oblique, leave much of the peristomial base exposed, and are widely separated by dorsolateral clefts from the lateral lobes. The latter arise, on either side, as a broad, well-rounded membrane, dorsal to the first setal fascicle, extend obliquely forward toward the ventral side, and terminate in a pair of elongate, auricular lobes, about as in typical *E. vancouveri*. The tube is thick, tough, chitinized, irregularly twisted. Except for differences in color, it seems impossible to separate these 2 individuals from *E. vancouveri*.

Another one from Tomales Point, ocean side, in rock crevices, was collected by George M. Good. It differs from the others in totally lacking eyespots on the radioles; there is no pigment (preserved). *E. tenella* Bush (Hartman, 1942, p. 86) is the only known *Eudistylia* lacking eyespots, but it too is questionably separable from *E. vancouveri*. Since the distribution of eyespots is very irregular on all specimens and their number on any one or all radioles not predictable, it seems that this character has little or no specific value.

### **Sabella media** (Bush)

Plate 23, Fig. 42

*Parasabella media* Bush, 1904, pp. 200-201, pl. 27, figs. 3-5, pl. 33, figs. 34-36, pl. 34, fig. 3, pl. 36, figs. 13, 14, pl. 37, fig. 30.

*Parasabella pallida* Moore, 1923, pp. 241-242.  
Hartman, 1942, pp. 79, 80.

Two individuals were taken from Tomales Point, ocean side, in rocky crevices. Tubes are thick, leathery, externally covered with fine sand grains. The body (preserved) is white or pale, the tentacular crown reddish brown, heavily mottled so as to appear velvety or fuzzy. The tentacular base is not spiraled as in species of *Eudistylia*, but the ventral edge is somewhat rolled in, giving an impression of slight spiraling. There are no true eyespots.

The collar consists of a pair of low, oblique dorsal lobes, and longer lateral lobes terminating ventrally in a pair of triangular ventral flaps. There are middorsal and ventral, and deep, wide, dorsolateral incisions. Thoracic notosetae include longer, narrower ones in the superior part of the fascicle, and somewhat shorter, broader, though similar ones (pl. 23, fig. 42) inferiorly; neurosetae consist of an anterior row of pennoned setae and a posterior row of avicular hooks. Abdominal parapodia are provided with avicular hooks in notopodia and limbate setae in neuro-podia. Length is 35 to 55 mm.

## Family **Serpulidae**

### KEY TO SPECIES

- |   |                           |   |
|---|---------------------------|---|
| 1. Tube tiny, coiled; body asymmetrical . . . . .                             | <i>Spirorbinae</i>        | 2 |
| 1. Tube larger, straight or somewhat twisted; body not asymmetrical . . . . . | <i>Serpulinae</i>         | 3 |
| 2. Tube sinistral . . . . .   | <i>Laeospira borealis</i> |   |

2. Tube dextral . . . . . *Dexiospira spirillum*  
 3. Opercular stalk cylindrical, operculum funnellike . . . . .  
 . . . . . *Serpula vermicularis*  
 3. Opercular stalk with knoblike protuberances, operculum funnel-  
 like . . . . . *Crucigera zygothora*

### *Serpula vermicularis* Linnaeus

Fauvel, 1927, pp. 351-352, fig. 120.

This cosmopolitan species inhabits rocky places at Tomales Point and Dillon Beach. Tubes are hard, white, cylindrical, but somewhat coiled near the base. The tentacular crown and operculum are often brilliantly colored red and white. Length is about 50 to 70 mm.

### *Crucigera zygothora* (Johnson)

*Serpula zygothora* Johnson, 1901, pp. 433-434, pl. 19, figs. 205-208.

At Tomales Point and Dillon Beach this occurs in rocky habitats. Tubes are thick, white. Length is 40 to 60 mm.

### Subfamily *Spirorbinae*

These serpulids are conveniently separated from the subfamily Serpulinae in the following characters: they are notably smaller, the tube is typically closely coiled, the body is asymmetrical and similarly coiled, the thorax consists of less than 5 setigerous segments, and the calcareous operculum has a smooth stalk, its distal, expanded portion used either simply for closing the tube or also as a brood pouch. Hermaphroditism is the rule. All species in this category have sometimes been considered as *Spirorbis*; but, since the group is a large, unwieldy one, it is preferable to recognize finer divisions (see Caullery and Mesnil, 1897, and others).

Two species are here recognized from the Dillon Beach areas, but others are to be found.

### KEY TO SPECIES

- Tube sinistral (that is, the aperture is on the left side when the tube is placed with opening below); thorax consists of 3 setigerous segments; collar setae distally crenulate . . . . . *Laeospira borealis*  
 Tube dextral (aperture is on the right side when the tube is placed with opening below); thorax consists of 3 setigerous segments; collar setae distally crenulate . . . . . *Dexiospira spirillum*

**Laeospira borealis** (Daudin)

Fauvel, 1927, p. 399, fig. 135.

Throughout the Dillon Beach and Tomales Bay areas, this occurs commonly on hard surfaces, algae or other foreign objects.

**Dexiospira spirillum** (Linneaus)

Fauvel, 1927, pp. 392-393, fig. 132.

Habitats are the same as for *Laeospira borealis* (above). The two species are sometimes found on the same surfaces.

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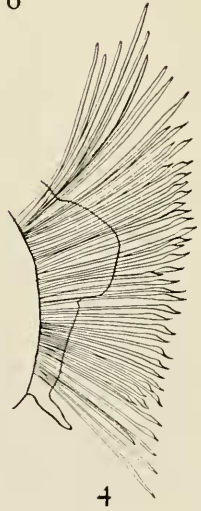
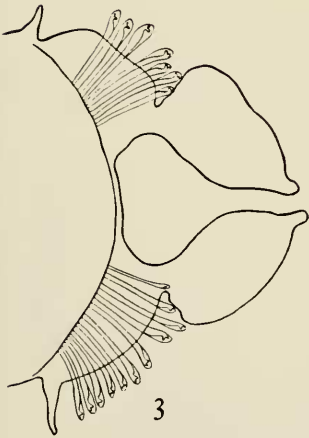
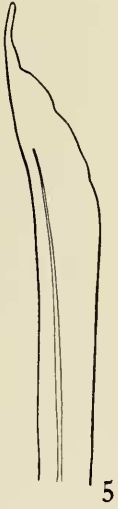
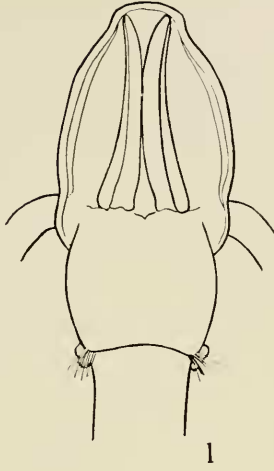
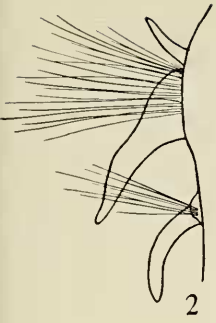
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## PLATE 19

Figures 1-9, *Magelona pitelkai*: Fig. 1, anterior end in dorsal view, showing prostomium, first segment and bases of paired palpi, x 29; Fig. 2, fifth parapodium from left side with large triangular, notopodial lamella (postsetal) and cirriform dorsal and ventral cirri, x 110; Fig. 3, tenth parapodium, with foliaceous, interramal lamellae, dorsal and ventral setae and hooks indicated, x 110; Fig. 4, neuropodium from ninth segment, showing arrangement of setae and ventral cirrus, x 110; Fig. 5, flattened notoseta from ninth segment, x 918; Fig. 6, flattened neuroseta from same segment, x 918; Fig. 7, long, slender seta from same segment, x 918; Fig. 8, hooded uncinus from tenth parapodium, x 918; Fig. 9, distal end of uncinus, hood removed, in frontal view, to show tridentate condition, x 918.



## PLATE 20

Figures 10-22, *Harmothoe lunulata*: Fig. 10, anterior end in dorsal view, including first 4 elytral pairs, x 52; Fig. 11, prostomium with first setiger in dorsal view, first elytra removed, palpi omitted, x 52; Figs. 12-18, outlines of elytra 1, 2, 3, 4, 8, 13, and 15, respectively, in dorsal view, from same individual, x 22; Fig. 19, a median parapodium in anterior view, setae indicated, x 52; Fig. 20, neuroseta from tenth parapodium, x 840; Fig. 21, a longer notoseta from same parapodium, x 840; Fig. 22, a shorter notoseta from same parapodium, x 840.



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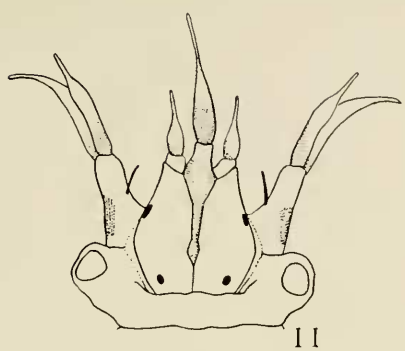
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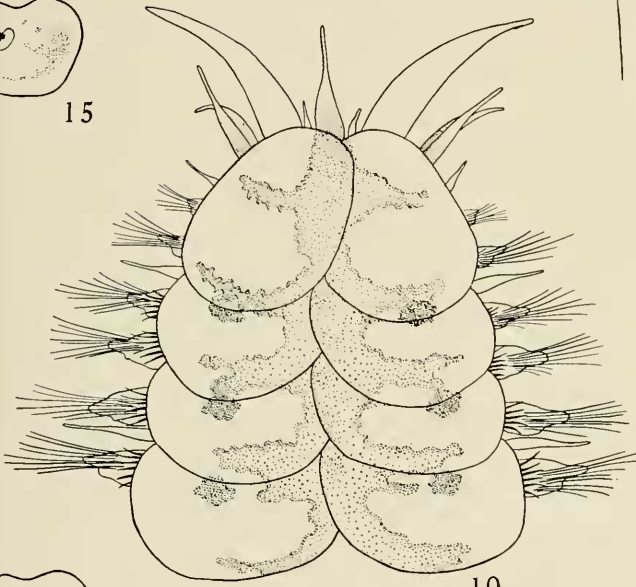
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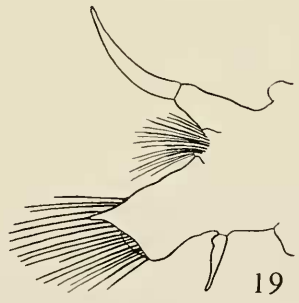
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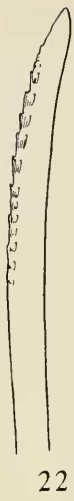
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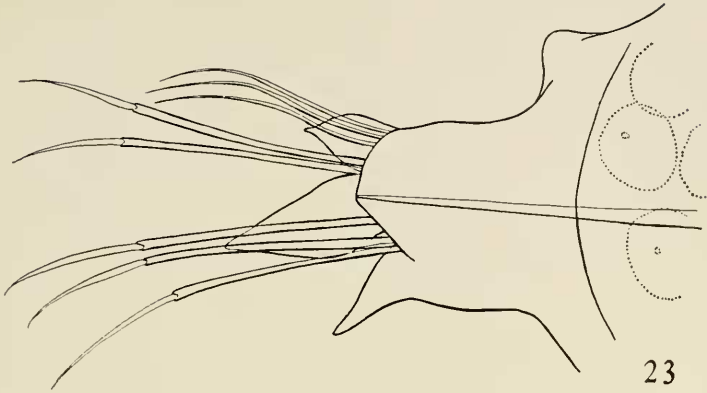
## PLATE 21

Figures 23-24, *Glycera tenuis*: Fig. 23, median parapodium in posterior view, x 204; Fig. 24, aileron from jaw piece, in lateral view, enlarged.

Figures 25-27, *Pectinaria californiensis*: Fig. 25, anal plaque in dorsal view, pressed flat to show lobed margins and arrangement of scaphal spines, x 30; Fig. 26, anal tongue in dorsal view, showing papilla and crenulate margin, x 30; Fig. 27, one of larger scaphal spines, x 670.

Figure 28, *Loimia montagui*: abdominal uncinus with 6 teeth, x 870.

Figure 29, *Ramex californiensis*: an entire branchia from right side, in posterior view, x 82.



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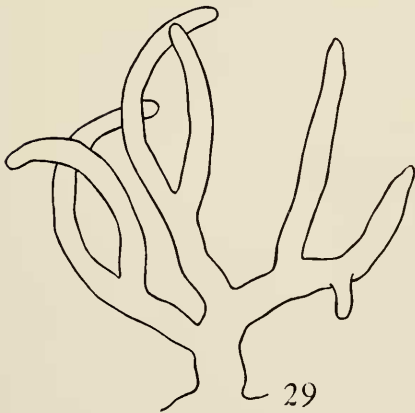
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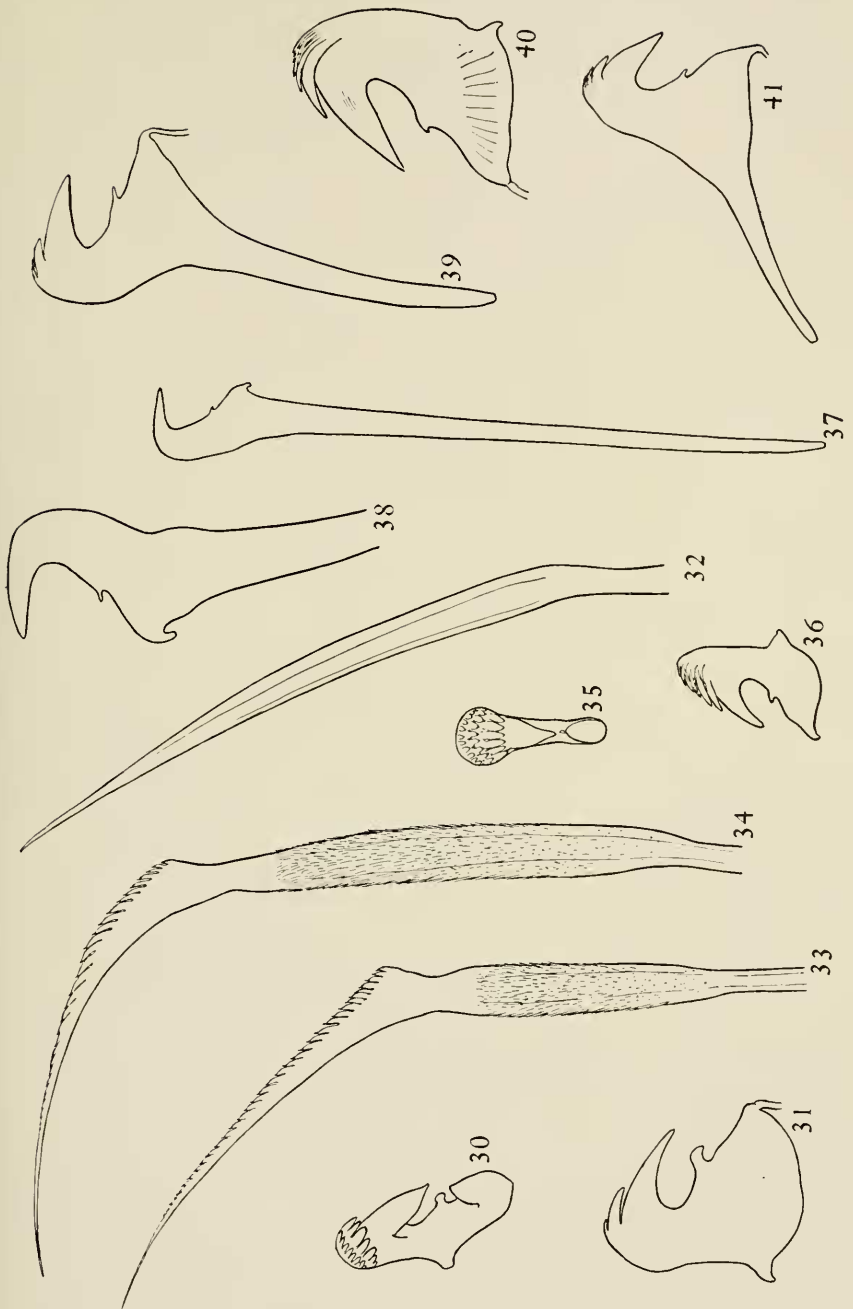
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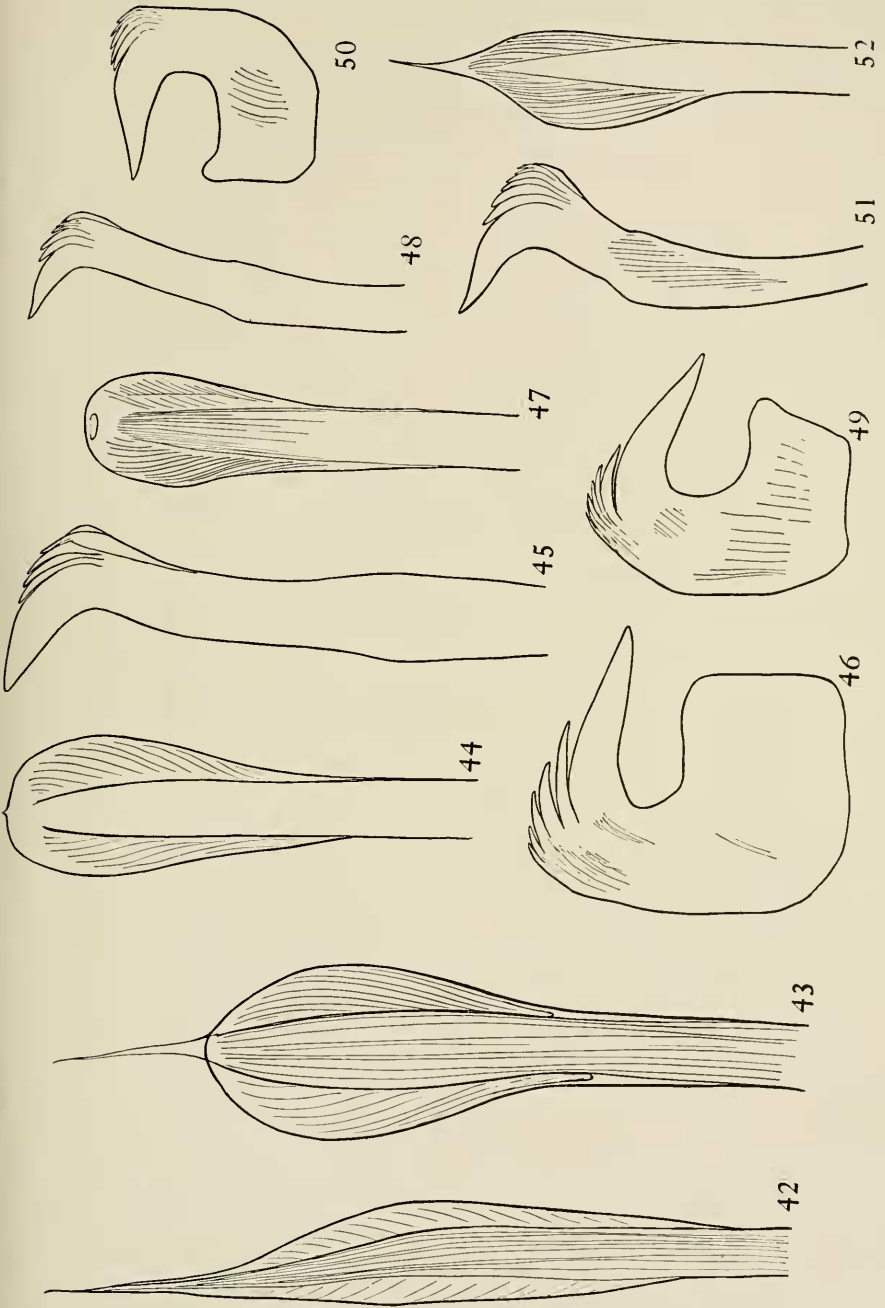
## PLATE 22

- Figures 30-32, *Ramex californiensis*: Fig. 30, uncinus from median thoracic torus, in frontolateral view, to show series of small teeth, x 870; Fig. 31, same, in lateral view, to same magnification; Fig. 32, thoracic seta, from same parapodium, to same magnification.
- Figures 33-36, *Spinosphaera oculata*: Fig. 33, one of shorter thoracic notosetae, showing spinous, inflated, and distal toothed regions, x 870; Fig. 34, one of longer notosetae, the tip somewhat unnaturally turned back, to same magnification; Fig. 35, thoracic uncinus in frontal view, x 870; Fig. 36, same, in lateral view, to same magnification.
- Figures 37-41, *Pista pacifica*: Fig. 37, long-handled uncinus, from first thoracic torus, in lateral view, x 102; Fig. 38, tip of same, enlarged; Fig. 39, a similar uncinus from fourth thoracic torus, x 175; Fig. 40, abdominal uncinus, x 335; Fig. 41, long-handled uncinus from fifteenth torus, x 175.



## PLATE 23

- Figure 42, *Sabella media*: inferior thoracic notoseta, enlarged.
- Figure 43, *Eudistylia vancouveri*: inferior thoracic notoseta, enlarged.
- Figures 44-46, *Chone infundibuliformis* (Sweden): Fig. 44, inferior thoracic notoseta with minute mucron, x 435; Fig. 45, thoracic uncinus, to same magnification; Fig. 46, abdominal uncinus, to same magnification.
- Figures 47-49, *Chone mollis*: Fig. 47, inferior thoracic notoseta, with depressed distal end, to same magnification; Fig. 48, thoracic uncinus, to same magnification; Fig. 49, abdominal uncinus, to same magnification.
- Figures 50-52, *Chone minuta*: Fig. 50, abdominal uncinus, x 850; Fig. 51, one of 11 uncini from median thoracic segment, to same magnification; Fig. 52, one of 7 inferior notosetae from same thoracic segment, to same magnification.

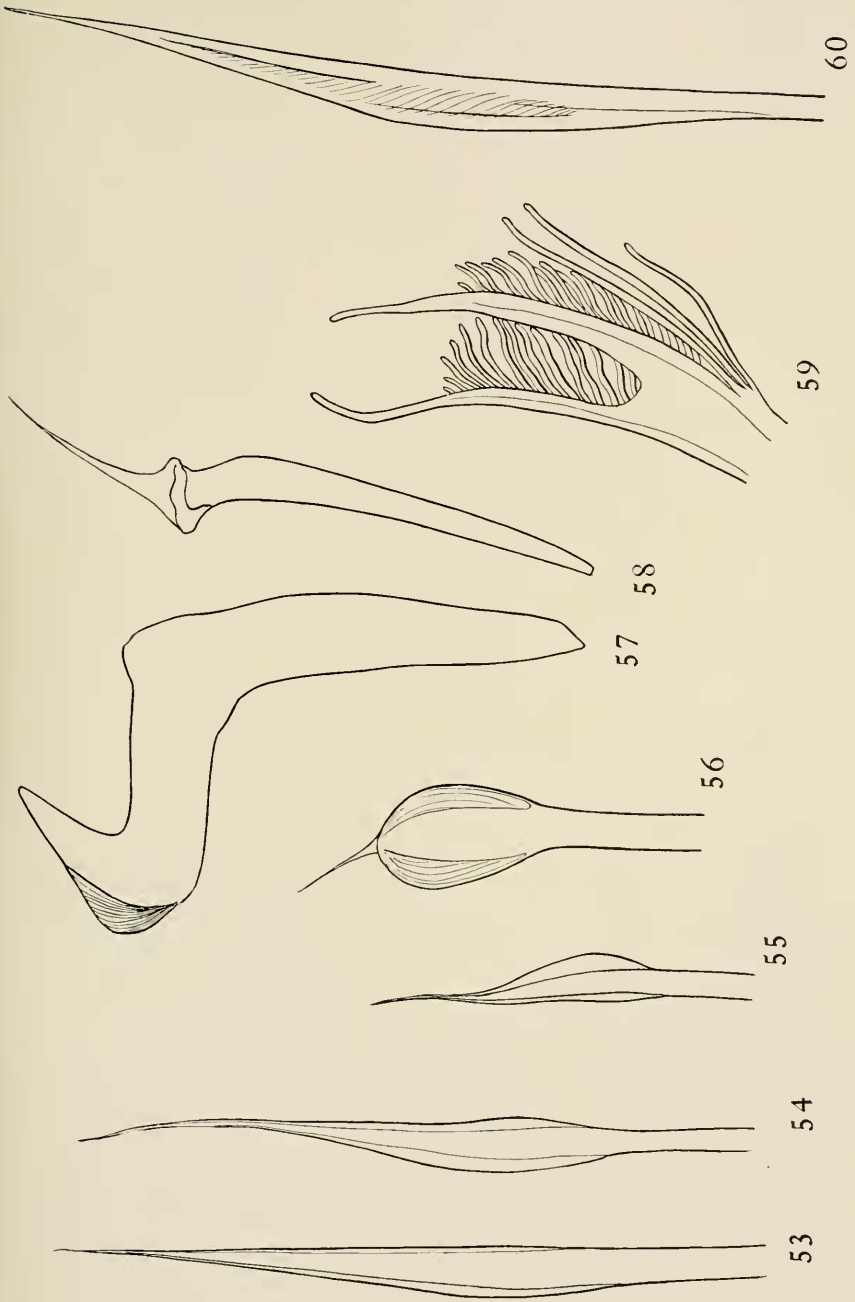


## PLATE 24

Figures 53-58, *Pseudopotamilla socialis*: Fig. 53, superior notoseta from second last thoracic segment, x 435; Fig. 54, one of 6 longer collar setae, to same magnification; Fig. 55, one of 7 shorter collar setae, to same magnification; Fig. 56, one of 10 inferior thoracic notosetae, to same magnification; Fig. 57, uncinus from second last thoracic segment, to same magnification; Fig. 58, its companion pennoned seta, to same magnification.

Figures 59, 60, *Chone minuta*: Fig. 59, portion of tentacular crown, from right dorsal end, showing outer side of 2 pinnated radioles with low palmate membrane, and 3 cirriform radioles at free end, x 21; Fig. 60, superior notoseta from median thoracic segment, x 435.





## PLATE 25

Figures 61, 62, *Pista pacifica*: Fig. 61, distal end of tube from side, x 1; Fig. 62, same, from open end, to same magnification.

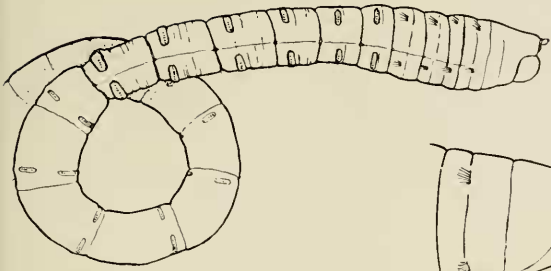
Figure 63, *Eudistylia vancouveri*: tube, complete save for short basal end, unnaturally coiled, x 1.



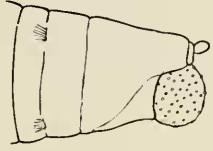
## PLATE 26

Figures 64, 65, *Mediomastus californiensis*: Fig. 64, anterior end in right lateral view, showing thoracic and first few abdominal segments, x 14; Fig. 65, anterior end, with prostomium and palpode, achaetous peristomial ring, first setiger and partly everted, papillated proboscis, enlarged.

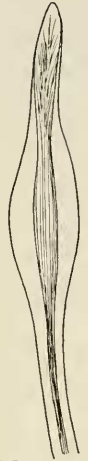
Figures 66-69, *Amaca occidentalis*: Fig. 66, anterior end in ventral view, with prostomial lobe, peristomial fold and first 9 thoracic setigers, x 5; Fig. 67, ventrolateral parts of third and fourth setigers from the left side, showing transition from elongate third parapodium to short fourth one, also nephridial papillae and third and fourth nephridia, enlarged; Fig. 68, cross section of inflated tentacle at widest part, showing concave groove, to same magnification as next figure; Fig. 69, an inflated tentacle from the dorsal ridge of peristomial fold, in ventral view, showing deep groove, x 12.



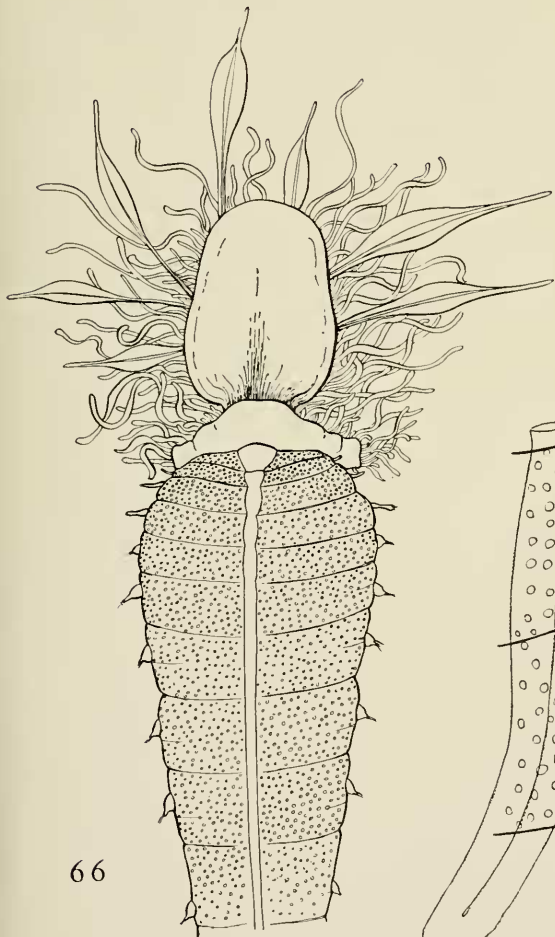
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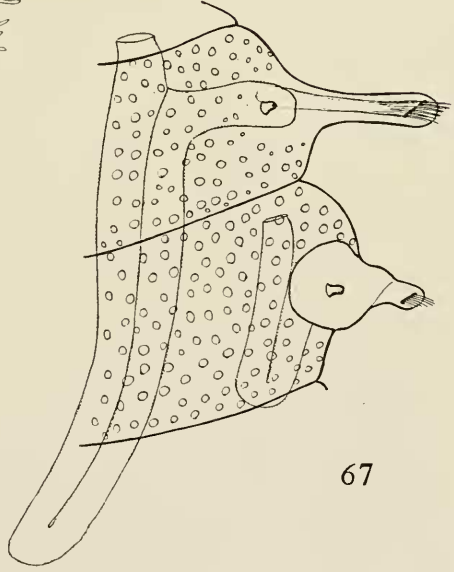
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